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U. T. FARMER

Panoramic View of Experiment Station Farm

Vol IV. No. 1

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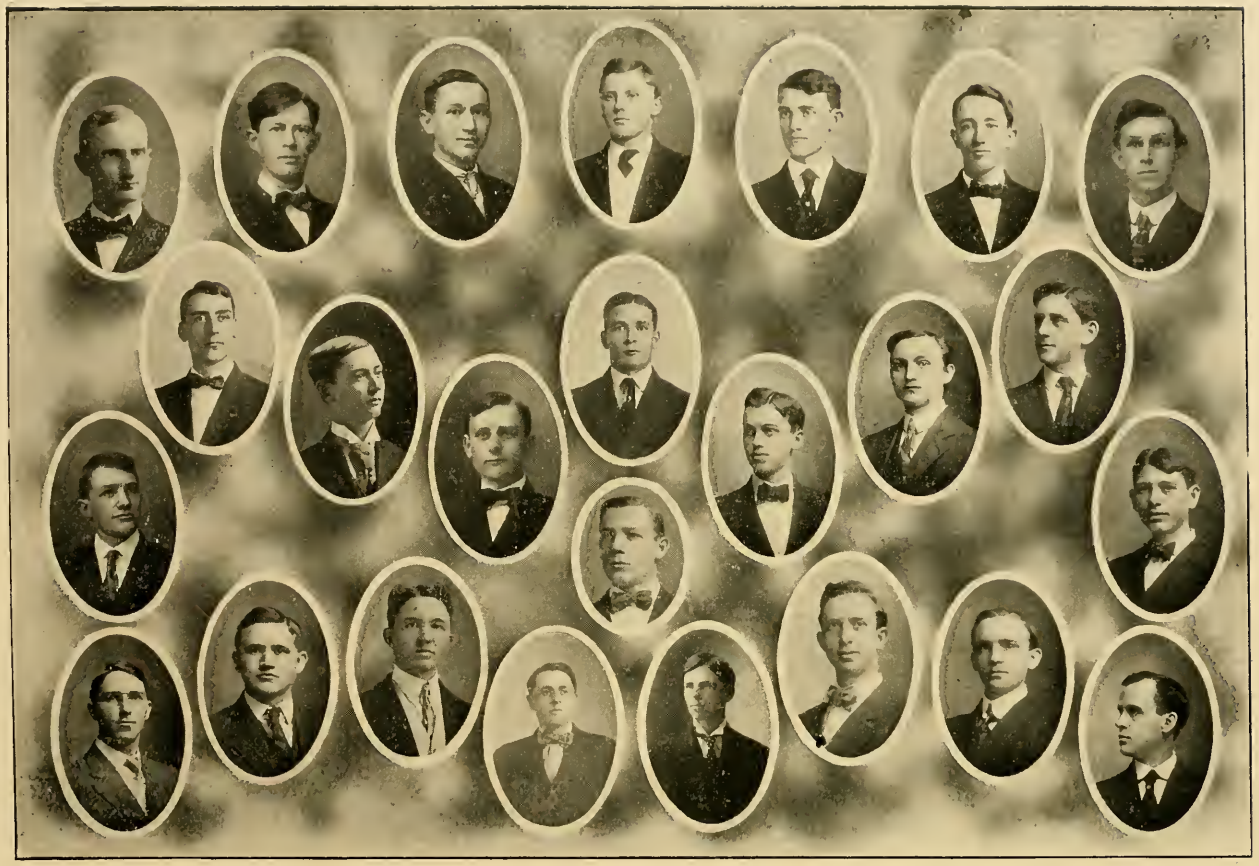


The Agricultural Club '08—'09

THE U. T. FARMER

Vol. IV. OCTOBER, 1909 No. 1

THE DOUBLE CROPPING SYSTEM ON THE UNIVERSITY FARM.

For several years certain portions of the the University Experiment Station farm have produced at least two crops each year and the system of management by which this is carried on should be a matter of much interest to every farmer in the State. The farm is divided into sections each with definite boundaries and on each of these sections a rotation of crops is practiced. The following data has been secured regarding the system for the past two years.

Section I is a field of average fertility with a gradual slope toward the South-east. The soil is a clay loam with a clay subsoil and is in good mechanical condition. In the spring of 1908 this field was sown to soy beans at the rate of ½ bushel per acre. The soil was worked thoroughly before sowing and after the plants were up they were cultivated three times with a 14 tooth cultivator. At the last cultivation the land was seeded to hairy vetch at the rate of 30 lbs. per acre. The soy beans were cut the last of September and yielded 15 bushels per acre. During the winter this land was top dressed with manure at the rate of 10 loads per acre. In April of 1909 this crop of vetch was plowed under. The soil was disced and harrowed and then seeded to corn at from 14 to 16 lbs. per acre. The variety was Cocke's Prolific and was planted for ensilage. The corn was harrowed (60 tooth harrow) after it was up and then cultivated with two-row cultivators throughout the growing season. On September 10th it was cut and put in the silo yielding from 12 to 13 tons per acre.

Section II. Part I adjoins Section I and is practically the same kind of soil. In the spring of 1908 this field produced a crop of alsike clover which had been seeded the previous year in September and which yielded 2 tons of hay per acre. The land was plowed and harrowed and seeded to Mammoth Yellow soy beans at the rate of 30 lbs. per acre. They were drilled in rows 36 inches apart and cultivated throughout the summer. At the last cultivation the land was seeded to hairy vetch at the rate of 20 lbs. per acre. This crop of soy beans yielded 24 bushels per acre. In April of 1909 the vetch was turned under and in May the ground was seeded to corn at the rate of 16½ lbs. per acre. The variety was Cocke's Prolific and was to be used as ensilage. On September 1 this was cut and yielded 10 to 11 tons per acre.

Section II, Part II, a field of 3 acres in spring of 1909 yielded a crop of red clover which had been sown March 14. This crop was harvested for

seed. The land was plowed and disced once then seeded to sorghum and cow peas at the rate of 7 lbs. sorghum and 16½ lbs. cow peas per acre. Red head sorghum and Whippoorwill cow peas were used. This crop was harvested October 12th and yielded heavily.

Section III, Part I is a heavy clay loam soil of better than average fertility. In the Summer of 1908 there was removed from it a crop of wheat and Vetch hay which had been sown the previous September. This crop yielded 2 tons per acre. The land was plowed and then put in soy beans at the usual rate. After the soy beans had been harvested in the Fall the land was disced and seeded to Wheat at the rate of 2 bushels per acre. This was top dressed with manure during the winter at the rate of 3 tons per acre. In April of 1909 this wheat was plowed under and the land seeded to corn, Cocke's Prolific. On September 5th this was cut, part to be used as seed and the remainder for silage. Since the removal of the corn the land has been disced thoroughly and will be seeded to vetch and wheat for hay .

Section III, Part II is a clay loam soil well supplied with humus and in good physical condition. After a hay crop of wheat and vetch of 2 tons per acre, this field was seeded to sorghum and cow peas at the rate of 10 lbs. sorghum and ½ bushel peas per acre. It was sown for ensilage and the varieties used were red head sorghum and Whippoorwill peas. This crop yielded when cut in September 11 tons per acre. In October the field was sown to a mixture composed of Snoma oats, 2 bushels, hairy vetch 15 lbs., and crimson clover 15 lbs., per acre. In May, 1909, this was cut and although the season was very wet and the mass very heavy it was cured successfully on frames and stacked in the field. The yield was 2½ tons per acre. After the removal of this crop the land was plowed and harrowed with a 60 tooth harrow then seeded to soy beans at the rate of 30 lbs. per acre with a two row Avery Corn planter in rows 36 inches apart. This crop is still standing but is mature enough to be cut for hay on October 10th.

It will be observed that in the first fields noted the winter crop, planted in the fall, was plowed in, thus being used as a fertilizer for the succeeding crop. Its value for this purpose fully warrants the practice, and it must be regarded as a crop quite as much as if it had been harvested. The last field noted attracted the enthusiastic interest of the East Tennessee Farmers' Convention, the winter crop of oats, vetch and clover having been purposely left standing so that the members of the convention could inspect it. The records of the past two years, as above outlined, should induce every farmer in the State to experiment in double cropping. Let us make our fields work for us throughout the year; it is the one great advantage we enjoy over Northern farmers.

—R. M. Murphy, '10.

THE CULTIVATION OF COTTON.

To the farmer of West Tennessee the proper cultivation of cotton is as essential as proper attention to any other line of agriculture, but strange to say, cotton growing in that section is little, if any farther, advanced than it was ten years ago. We are compelled to attribute this condition to one of two things; lack of knowledge regarding the crop or a "don't care" disposition on the part of the individual . Failure to practice judicious rotation of crops, lack of attention to seed, too deep cultivation ("plowing") and too high ridging, which causes the plant to suffer for both food and moisture, are common mistakes. In the following paragraphs we will try to outline some of the fundamental principles involved in the production of the crop.

There are several species or types of cotton, among which are the Egyptian, Indian, Sea Island, Peruvian and American Upland. This last one interests us mainly as it is the type we can grow with best results. As to the variety adapted to Tennessee conditions, we would suggest Truitt, Pride of Georgia and Triumph as three standard varieties the merits of which are worthy of consideration.

The big boll varieties, Pride of Georgia and Triumph make a vigorous growth but are later in maturing than the Truitt, a fact which argues unfavorably for their future as earliness favors the control of the fast spreading and destructive boll weevil.

In the selection of seed, we should endeavor to obtain that which is home grown rather than to bring seed from any great distance. By the judicious and careful selection of our own seed we can both increase the yield and improve many desirable qualities such as size of boll and length of fiber.

The cotton plant generally has a tap root but, in any event, the lateral roots are found extending out in all directions for three or more feet. The depth of most of these roots ranges from three to nine inches, a point which must not be overlooked in proper cultivation, the depth of which should be regulated so as not to cut them off.

The composition of the plant, including lint and seed, is such as to warrant careful consideration. The plant as a whole is composed mainly of carbon, hydrogen and oxygen, elements which are derived from air and water, in the process of plant growth. The seed, however, contains a large amount of nitrogen which comes from the soil. The percent is such as to exhaust the land provided continual cropping is practiced

The cotton plant is extremely sensitive to temperature conditions and requires four or five months of rather high temperature for its vegetative growth. As to the rainfall, it requires an abundance during the growing period, but comparatively little during ripening and rain during the picking season is detrimental.

Good sandy loams or silt loams make the best soils for cotton which

prefers mellow, friable and well drained soils. It is an unfortunate but recognized fact that lands deteriorate when planted repeatedly in cotton. This condition can be remedied, in part, by a rotation of crops. A good rotation for Tennessee would be corn with peas the first year, wheat or oats followed by peas or soy beans the second year and cotton the third year. In both corn and cotton should be sown, if possible, some good clover crop as vetch, crimson clover, rye, etc., and thus avoid the bad condition of leaving the land bare during the winter.

It is with some hesitancy that the question of commercial fertilizers is discussed for every farmer should produce his fertilizers at home in the form of barn-yard manure; but where a sufficient quantity is not available, the use of a good fertilizer is suggested. For West Tennessee the following is perhaps as good as any : 160 lbs. acid phosphate (14%), 200 lbs. cotton seed meal and 25 lbs. muriate of potash, the mixture to be bedded on, twelve or fifteen days before planting.

In preparing the seed bed, the ground is first broken, then made into alternate beds and middles, the bed being about six inches higher than the middle. On hilly lands, these beds should follow the contour lines, in order to prevent the washing of the land. In case cotton had been on the land during the previous year, then the common practice is to bed on the center furrow of the last crop. Subsoiling has been tried at various stations without very favorable results.

As has been pointed out, the seed should be carefully selected instead of waiting till planting time and then dumping in a pile of faulty and immature seed.

Experiments throughout the country indicate that one stalk of cotton is enough per hill. The width of row and distance between the stalks varies with the soil, variety and lattitude, the poorer soil and the smaller varieties permitting narrower rows and closer spacing. The width of rows ranges from 2.5 to 4.5 feet and the distance between plants from 8 to 20 inches. The cultivation does not begin till cotton has been planted two to four weeks, at which time the rows are "barred off" rather close, chopped off and then redirted. This operation is repeated about every ten days for three or four times, after which the soil is best stirred with some surface cultivating implement. Toward the last cultivation, we should never go deeper than is necessary for destruction of weeds, etc. A general rule is to cultivate the crop till the limbs hide the ground, but there is probably no advantage in late cultivation unless some weed growth is destroyed.

—Jno. F. Farrow, '10.

STUDY OF LOCAL AGRICULTURE IN THE RURAL SCHOOLS.

When a teacher takes up his work in a new community it is an excellent plan for the teacher and pupils to make an agricultural census of the territory in which the patrons of the school live. This will give them a knowledge of local agricultural conditions which can not be obtained in any other way. In making this census the principal defects in the local agriculture will become apparent, and it will be possible through the State Experiment Station and the United States Department of Agriculture to secure literature adapted to local needs. In this way the work can be made of great assistance to the patrons of the school.

While there are many ways of going about this work, the following is suggested in the absence of a better plan: First, ascertain from the pupils, if possible, the limits of the territory in which the patrons of the school live, Draw a map of the region. Each of the more advanced pupils who may be assumed to be interested in agriculture should prepare one of these maps for his own use. They should be drawn to some convenient scale, say, a mile to the inch. If the territory from which the pupils come extends for 2½ miles in all directions from the school house, this would make a map about five inches square. Experience may show that it would be wise to make the map twice as large; that is, let an inch on the map represent half a mile. It would be a good plan for the teacher first to draw a map of the district on the blackboard, or on a large sheet of paper, putting in first only the outline of the region and locating the school house upon the map. Then let each of the pupils copy it. Each pupil should then insert on the map the road by which he comes to school. It would be the best plan to have the pupil insert this road first on the large map on the blackboard, the pupils taking turns at inserting the roads by which they come to school. In some cases there will be other roads, and these should be inserted by anyone who is familiar with them. When the large road map is completed on the blackboard then each of the pupils should copy it onto his own map.

The next thing to do is to have each pupil draw on the large map an outline of his own farm. Farms that are not represented by pupils in school may be drawn in by children from neighboring farms, the information necessary to draw these maps being obtained from those living on the farms in question. Then let each pupil copy all these farm outlines onto his own map.

Next, the creeks and rivers should be inserted on the large map and copied by each pupil.

Those sections of the territory that are occupied by timber should be indicated by cross marks on the general map and copied by the pupils. Rocky hillsides should be indicated by small circles. An appropriate means should be used for indicating any other important geographic features of the region. The idea is first to have the geographic features made on the general map, which is large enough to be seen all over the school room, then

for each pupil who is studying agriculture to copy it onto his own map.

The next thing to do is to have each pupil ascertain the number of acres of cultivated land on his own farm. Farms not represented by pupils may be investigated by children on neighboring farms, or in special cases a committee of pupils may be appointed to interview a farmer concerning this matter. The teacher should then take the crops of all the farms and add them together. By dividing the sum by the total area of the region tributary to the school the per cent of cultivated land is obtained. This raises certain questions for discussion. For instance: suppose the percent of cultivated land is 20. The question naturally asked arises "Why is not more in cultivation?" On the other hand, suppose 90% is in cultivation. Then the question arises "Is there timber enough grown in the section to supply its needs?" This leads to the question of what proportion of land should be in timber in order that local needs for timber may be supplied.

If the region is a timbered one and there is standing timber anywhere near the school house, it is an excellent plan to measure off an acre of timbered land and estimate the amount of mercantile timber upon it; also the amount of young timber not yet of merchantable size. The kinds of trees growing on the acre should be determined. If there are any kinds which no one knows the name of, the name may be obtained by sending twigs, with leaves, to the State Experiment Station. The approximate age of trees of different sizes and different kinds may be obtained by counting the rings in stumps or logs. In this way it will be possible to get an approximation of the number of years required to grow a given amount of timber; or, to put it in another way, the value of the timber grown in one year on an acre of land. By ascertaining the value of this timber the income from land handled as forest may be estimated.

The number of acres of every crop grown in the district should be ascertained. The pupils can get this information from their parents and from the owners of farms from which no pupils come to school. The percentage of cultivated land devoted to each kind of crop should then be ascertained. If any crop occupies a considerable proportion of the cultivated land, apparently more than its share, ascertain why this is the case. Ascertain whether any particular rotation of crops is followed on any of the farms in the district.

The actual yield of each crop on every farm in the district should be ascertained also the total yield of each crop on all the farms. By dividing the total yield by the total acreage of a given crop gives the average yield per acre. If any of these average yields are low the question naturally arises "Why?" and the answer to this question can usually be found.

The average acre value of each crop raised should be ascertained. It will be found that some crops have a much higher acre value than others. This raises the question "Why are the less valuable crops grown." It will

frequently be found that farmers have a good reason for growing these less valuable crops. They may fit a vacant place in a rotation, or they may be necessary for some special purpose. For instance: oats frequently do not yield enough to be of great value, yet their value as feed for horses frequently justifies the farmer in growing them.

Ascertain the uses to which each crop grown is put.

Find out how much fertilizer is brought into the region and what it costs.

Find out what the annual sales of all the farms are; that is, the total amount of income from material sold from the farms. In this work be careful not to bring out publicly any comparisons between poor and wealthy patrons. Put only totals on the blackboard.

In making this study a good many problems will be met with the solution of which can be found in the bulletins which can be had from the State Experiment Stations and the United States Department of Agriculture. Suppose, for instance, it is found in a given section that Johnson grass is a troublesome weed. The Department of Agriculture has a bulletin telling how to eradicate Johnson grass. In such a community this bulletin should be in the hands of every farmer.

In the State of Illinois, in making a study of this kind, it was found that the oat crop was seriously injured by smut. The teacher took her class in agriculture to a nearby oat field, measured off a small plot of land a few feet across, counted the number of oat heads in the plot, and also the number of smutted heads. In this way it was possible to calculate the percentage of the oats ruined by smut. The farmer told them what yields he ordinarily got from oats, and then the pupils calculated what yields would have been obtained had the seed been treated for smut. This led the farmer to get a bulletin on oat smut and treat his seed the next year, which fact added $150 to the value of his oat crop.

It will be seen that the method of study here outlined is a study of actual farming, not a study of books about farming. Such a study will interest every farmer in the community. Both pupils and teacher will find agriculture the most interesting subject in the school. It is impossible, of course, in a short article like this, to point out all the things that can be done; but the teacher who has a little initiative will notice a great many things worthy of further study as the work progresses. I will mention only two more.

Suppose the section is one in which potatoes are grown and the farmer grows his own seed potatoes. If school is in session when the potatoes are being harvested, let the class go to the potato field and dig a few rows with a fork, counting the number of merchantable potatoes in each hill. The principle of selecting seed potatoes can be taught here. Only those hills which have a considerable number of good potatoes in them should be saved for seed, and every potato in such a hill should be saved.

In the same way the selection of corn for seed can be taught. Take the

class to a field of corn just before picking time. In selecting seed corn look first for a good strong stalk standing upright. Next look for a good heavy ear that hangs over instead of standing up straight. Such an ear is less liable to be injured by rain because it is better protected by the husk. It is also usually heavier than the upstanding ear. Then strip back the husk on the ear to see if the grains are in nice straight rows. If so, such an ear should be saved for seed. It would be a good plan to have the pupils select enough seed corn in one field to replant the field next year. The farmer who uses this seed will note marked improvement in his corn the next year, and each pupil can be induced to select seed corn in this manner for his own field. Such work as this will have an important and permanent effect on the agriculture of the community.

W. J. Spillman,
U. S. Department of Agriculture.

EXTRACTS FROM AN ARTICLE BY A SUMMER SCHOOL STUDENT OF AGRICULTURE.

The short course in agriculture for teachers finds a champion in almost every student who has taken it. Miss Jessie Basford, of Woodford, Tenn., in an article in the *Leaf Chronicle* of Clarksville, expresses an appreciation that we would gladly repeat, did space permit. We must be content with extracts. Miss Basford says:

"Having studied agriculture in the University of Tennessee for the past two summers, I have been fully awakened to the importance of agricultural education for our rural schools, and I believe if the nature of the work given in the summer course for teachers and the short winter course for farmers were better understood, more of our teachers, superintendents and farmers would take advantage of the free courses offered. * * * * I registered rather reluctantly in the Agricultural Classes, feeling that a penalty was being imposed upon me, and not having very much respect for the so-called book farming. Much to my surprise, instead of finding the agricultural lessons dry and uninteresting, it was revelation after revelation from the first lesson until the last. I was among the number who went to scoff, but remained to pray. My conversion, though genuine, was not instantaneous; as the different instructors faithfully preached the gospel of agriculture the light gradually dawned in upon me. The subject was presented to us from the farmers' point of view, which is that of economic production, and agriculture was defined as the science of applying science to economic production. We learned that this is the only correct basis for classifying scientific agriculture. We had not studied the subject long before we discovered that the problems of agriculture today are as much sociological as scientific, and we did not need to be told that the development, prosperity and salvation of our country depend upon the science of agriculture, and

that we need men of the broadest vision to idealize it as a mode of life. Away with the idea that only the dull boy who is fit for nothing else can farm.

We learned that there was something wrong in the education that would make a forty dollar clerk out of a boy who might have been a forty thousand dollar farmer. Something must indeed be wrong about an education that does not enable the farmer's son to look more carefully after the conditions of the crops, the stock, the fences and gates, the daughter to be more ingenious in cooking, sewing and housekeeping. We were told that education means social efficiency and that the most necessary knowledge is the knowledge of our environments. This knowledge, which is the child's birthright, is the teacher's duty to impart. * * * Some one asked me if I found the study of cattle ticks and stomach worms as interesting and delightful as the study of birds, flowers, etc. I answered very readily, a great deal more so. When we get our eyes anointed with the oil of the gospel of agriculture we see things from a new view point, and as some one has very quaintly said: "The flower in the crannied wall may prove a weed and the sleeping chrysalis a pest, and the Berkshire a thing of beauty and a mortgage lifter." The fact that the study of these biological problems helps to fill empty stomachs and clothe shivering nakedness, does not make them less interesting, or detract from their aesthetic value. We do not say less of music, literature and art, but more of the common, practical things of life. Life is a very practical thing, but we would not unduly emphasize the utilitarian at the expense of the ethical and aesthetic.

We found in our course of study that agriculture has three values—an educative or informational, a cultural and an economic, and it is claimed for it what no other course offers, two educations, a professional and a liberal. No other study will give so broad a culture, and put us in touch with the thought of the whole world as scientific agriculture. The elementary sciences that the study of practical agriculture presents to us, causes us to catch the spirit of the creative genius, and as we are brought into closer touch with the Creator as He reveals Himself in nature, we stand all bewildered with wonder, admiration and love as never experienced before, and we catch the significance of King Solomon's admonition, "Go to the ant, thou sluggard, consider her ways and be wise."

We learned that the ultimate purpose of agricultural education is citizenship. Don't you think it worth our while to give this subject our prayerful consideration in view of the fact that the children of this land are to become heads of families and wield the ballots that are to shape the destiny of our country. No country can be successfully governed without intelligence all will agree, and from the knowledge gained in two short summer courses in agriculture I can boldly say without fear of successful contradiction that *this intelligence depends upon agricultural education.*

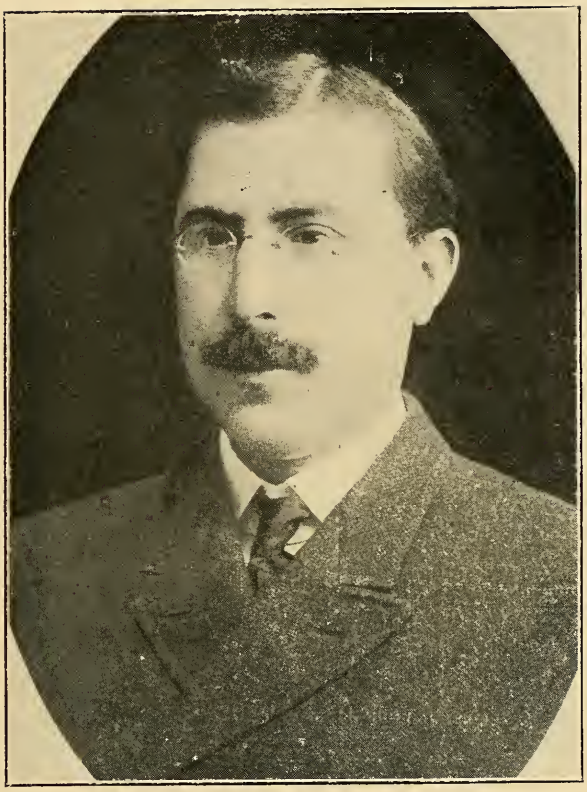
PROF. W. J. SPILLMAN, U. S. DEPARTMENT OF AGRICULTURE

SUMMER SCHOOL NOTES.

The United States Department of Agriculture has been most helpful in providing lectures for the Agricultural Short Course for Teachers. In 1908 Messrs. Spillman, Crosby, Knapp and Ludworth were with us, and during the session of 1909, Experiment Station investigation gave you lectures. Doctor Lipman and Doctor Spillman gave valuable lectures. Dr. Lipman is a soil chemist and bacteriologist, and his course in soils, illustrated by laboratory experiments available for any high school teacher was of the greatest practical interest; for it dealt with a difficult subject and was a demonstration of a teaching method.

Dr. Spillman has a national reputation as a lecturer, and illuminates every agricultural subject on which he talks. A trained agristologist, his large experience and observation has given him a breadth of view that is not confined to any one department of agricultnral knowledge. His approach is always that of an experienced farmer, so that his lectures are characterized by strong common sense.

Professor Christie, of Purdue University, quite won the teachers by his clear presentation of the pedagogics of agriculture. Every one felt



Dr. J. G. Lipman, Soil Chemist and Bacteriologist, New Jersey Experiment Station

that Professor Christie had been in the school room, and was giving methods that he had successfully employed there.

All in all, the special lecturers of 1909 added greatly to the interest and value of the session.

The Agricultural Short Course for Teachers the past summer was marked by increased enthusiasm and good work. The professors were never more deeply interested, largely because of the earnestness of the students.

Even the few who made a rather poor start caught the spirit of their fellows, and very early in the course success was assured.

There was more demonstration than ever before—more excursions to the University farm and to the fruit farm and more work when these places were reached.

And all that means better teaching in the schools. Every student was impressed with the importance of minimizing text-book work in the teaching of agriculture and of emphasizing laboratory method. And everybody found that field, garden, orchard, dairy, and live stock constitute the laboratory of the agricultural teacher—no four walls are big enough to bound it, and no school is too small to be without it.

PROF. G. I. CHRISTIE, PROFESSOR OF AGRICULTURAL EXTENSION, PURDUE UNIVERSITY

The Summer school student has become the winter school teacher, and it is a pleasure to know that in many instances agriculture has been carried from the University to the school room, and from the school room to the community.

Some of the teachers are doing good work in their county papers with strong articles on the teaching of agriculture in the schools. Mr. Hugh L. Callahan of McMinn County is the author of two thoughtful articles in an Athens paper that are bound to make their readers think. An article by Miss Basford is summarized in another place in this issue.

One grave danger for agriculture in the public schools is that it shall become a text-book study, pure and simple. No Summer School teacher will ever present the work that way. The County Boards of Education should select teachers trained in methods of presenting agriculture, especially for their high schools.

In a recent letter to Professor Morgan, Dr. Spillman says:

"I was very much impressed by the spirit prevailing amongst the students at Knoxville. You have certainly got them interested. Unquestionably it will only be a few years until agriculture is adequately taught in the rural schools of Tennessee."

EDITORIAL.

With the beginning of this the fourth year of the U. T. Farmer's existence, we come before you with high aspirations for the future of our publication and earnestly solicit your hearty co-operation in making this the most prosperous and most beneficial year of its existence. We would cast no reflections whatever on the management of the past but, on the contrary, a great debt is due the few earnest students who have so faithfully stood by the paper and kept it going. As conditions improve it is but fair to our patrons and friends that the paper improve also. We are under many obligations to those who have aided us. Let us, as a body of students, take this matter to heart and get behind the Farmer with a zeal heretofore unknown and make of it a publication of which each of us shall have a just right to be proud because of the effort we have individually made toward making it a success. The Seniors have an opportunity of adding more prestige to their already enviable record as a class, by making this year's paper the best and most representative within its history. All other agricultural students should be impressed with the fact that within their course at the University they may be called upon to assist in the publication of the Farmer. Within your midst are to be found the Editors and Managers of the paper for the next three years. Now is the time to become intimate with the affairs of the management and above all things to learn how to write something that will be read with interest and profit. May we all realize that in this we have a great privilege and opportunity and also that it is our duty as agricultural students to support our paper.

The educated farmer must not only be a successful husbandman. He must be a useful citizen, and he should be a leader in every effort for the betterment of his community and his State. To do this he must have the power of expression. Writing maketh an exact man, and The U. T. Farmer offers every agricultural student of the University an opportunity to improve himself in this particular.

* * * *

This year's State Fair, which was held at Nashville, September 20 to 25, was certainly a most successful and interesting one. The management had so perfected their plans that everything progressed smoothly. The attendance was very large, but not hardly so large as last year. Everybody was interested in the exhibits.

It was a source of much gratification to the writer and I feel sure will be of interest to every agricultural student to know of the interest taken

in the Fair by former students of the University. Those students, especially, who returned to the farm after leaving the University were there in full force and were to be found with the prize winners, not only in live stock but in other agricultural products as well. The Short Course men were there, everyone standing loyal in his support of the University.

There are several ways in which the Fair needs improvement. It is not representative enough of the State. But a small number of the counties of the State were to be found represented by exhibits. Such a condition is deplorable. We, who live in counties not represented are doing ourselves and our counties an injustice by failing to exhibit. Much success in the world today is due to advertising. A casual observer would have concluded that only about one-third of the counties of the State produced anything worthy of note. This should not be. A State Fair should display something from every county within its borders and until this point is reached it is not what it should be.

Another unsatisfactory condition exists due to lack of competition for prizes. A great many prizes are offered, prizes for practically everything produced upon the farm, but there are few competitors and as a result these prizes are taken by a very few people, who, realizing the situation, make entries in nearly every class and since competition is so slight are often awarded prizes on other than first class articles. After the prizes had been awarded it was possible to hear often from the onlookers such remarks as "Why, I had much better than that at home," or "Those vegetables or that corn or that fruit is not near so fine as I grew." If you had something better it was certainly your duty to bring it along; it is but fair to the management. They offer prizes for the best of everything and the best should unquestionably be displayed. Let us awake to the demands of the situation, and determine now that next year we will do all that we can to make the Fair the most representative and the best ever held within the State. Unstinted praise was lavished on the live stock exhibit, and deservedly, for in every class, except draft horses, animals of the best type were shown and competition was keen..

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The U. T. Farmer is under obligations to Professor Spillman for the excellent article on the Study of Local Agriculture in the Rural Schools, which appears in this number.

When a prominent member of the staff of the United States Department of Agriculture takes time to write for a student publication it is an indication not only of the helpful attitude assumed by the workers in that department of the government, but in no small degree it is an endorsement of the magazine by men whose endorsement means something.

PERSONALS.

Dr. G. E. Nesom, Director of the Bureau of Agriculture in the Philippine Islands, gave a splendid illustrated lecture in Morrill Hall one evening during the opening days. The lecture was both interesting and instructive, and was complimented by all present.

Mr. M. O. Eldridge, a representative of the Department of Agriculture at Washington, also gave a splendid illustrated lecture on good road building. Mr. Eldridge is an old U. T. man who has made quite a reputation.

L. R. Neel (07) is connected with the Experiment Station doing cooperative work in Middle Tennessee. Mr. Neel succeeded Mr. Ewing Hite, who has been taking postgraduate work at Illinois. Mr. Hite is now on his farm near Gallatin.

J. F. Voorhees (09) is a candidate for a Master degree and is still connected with the Weather Bureau.

Prof. C. H. Lane (09) is now instructor in Agronomy. Mr. Lane spent a part of the summer visiting North-eastern Universities, making himself acquainted with the methods of teaching in the principal ones.

A. W. Shofner (09) is teaching agriculture in Tyner High School, he is well pleased with his work and is doing well.

D. W. Parker and A. J. Powell will remain at home on the farm this year.

The Agricultural Club held its first regular meeting September 28. Many new men were out and the club shows great development.

All of the '10 class returned, all except two of the '11 class, the majority of the '12 class and the '13 class is the largest in the history of the University.

Prof. G. M. Bentley is now State Entomologist and has been succeeded as Professor of Zoology by Dr. A. A. Schaeffer of John Hopkins University.

Prof. S. H. Essary has taken up station work and has been succeeded by Dr. E. S. Reynolds as Assistant Professor of Botany.

Mr. H. H. Hampton is taking a medical course at John Hopkins University, and is succeeded by Mr. S. Leavitt, from the Bureau of Chemistry of the U. S. Department of Agriculture.

Prof. F. C. Quereau is on a rice farm in Louisiana. His successor has not yet been selected.

Mr. W. H. Maynard is now Assistant Chemist in the Agricultural Department.

R. M. Murphy and R. R. Blake attended the State Fair at Nashville, and made a good report at the Club meeting, October 2nd.

Prof. Maurice Mulvania is making an extended trip through the Northwest visiting colleges, he will spend a few weeks at his home in Nebraska.

G. R. Worthington (10) visited the Alaska-Yukon Exposition at Seattle, Wash., and other places of interest in the North-west during the summer vacation.

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THE GROWTH OF THE SOY BEAN INDUSTRY.

Not a few of the manufacturers of cotton seed products are alarmed at the present time owing to the sudden decrease in sales of their products in foreign markets. As a consequence of this there was set on foot by the Department of Commerce and Labor an investigation as to the production and rise of the soy bean and its products in the far East and of the extent to which they compete with American cotton-seed products in the European markets.

Let us now review the condition of affairs relating to the soy bean as reported by the various European and Asiatic consuls. In doing this it is hoped that the farmers of the South will get a broader view of the possibilities that are before them in this new competition for a permanent foreign market and will neglect no opportunity to secure their share in the trade of nations.

De Candele says that the soy bean began originally in the wild state in the region from Cochin China to the south of Japan and of Java and today we find that the bean is produced chiefly in the northern part of China, it being the principal product of Manchuria, whence it is exported in large quantities through Newchwong, Dalny and Vladivostok. Not only the bean but the custom returns at Canton for 1907 disclose that soy bean cakes are exported from Chinese ports of Kiachow, Chefoo, Yachow, Hankow, Wuhu, Nanking, Chuckiang, Shanghai, Hangchow and Swatow. The quantity exported in 1907 was 557,601,200 pounds, valued at $7,318,648.00; Japan taking 556,347,866 pounds valued at $7,300,294.00. The United States imported but 2,123 pounds valued at $18.40.

The method of manufacturing bean cake is decidedly primitive. The beans are first crushed beneath a millstone and then steamed for 15 minutes. The resulting mass is spread out and placed in circular iron frames about 6 inches deep. Five of these frames are placed one above the other in a vertical press, consisting of four uprights with cross beams at the top and bottom. Pressure is applied by means of wedges, driven in between the cross beams and beams on top of the frames and the oil pressed out. From 140 to 150 pounds of beans will yield between 40 and 50 lbs. of oil. The residue in the frames is commercial bean cake. Each cake weighs approximately 100 lbs. This is typical of the various methods used throughout China in the manufacture of the bean cake and is of interest in relation to our American cotton seed cake and oil process.

Ever since the year 1790 efforts have been made to introduce soy bean products from the far East into the European markets in competition with other manufactures from oleoginous seeds but they have been generally unsuccessful apparently owing to the inferior quality of the cake and oil. For some time England has been crushing the soy bean seed on a small scale but in 1908 a new impetus was given the manufacture of such products because the importations last year of linseed and cotton seed were in very bad condition and the crushers therefore welcomed this new source of raw material. It is not quite a year since the importations to England began on a large scale, for last December five steamers started from the far East with shipments aggregating 50,000 tons of the beans. These were followed by other shipments to England and other European countries aggregating, it is said, about 400,000 tons. Several British firms of seed cake manufacturers have conducted series of tests to demonstrate the uses to which the soy cake meal and oil may be put and it is claimed that the results have been eminently satisfactory. The seed crushers in England have been very active in seeking outlets for their products and have offered them in practically every market for such manufactures in Europe.

All that is necessary now is for the manufacturers of soy bean products to prove that they are equal in quality and may be put to the same uses as cotton seed products.

Let us consider a little the situation touching this subject on the continent. Since Denmark is famous for its dairy products it would naturally be sought as a market whenever a new food product such as soy bean cake appeared. Prices c. i. f. Copenhagen ran as follows: Soy cake $31.50 as compared with $32.50 for sunflower cake and $33.25 for cotton seed cake. Up to the present time sunflower cake has been the strongest competitor of cotton seed cake but as an importer writes, referring to the soy cake, a new competitor is now appearing in the market in enormous quantities and it looks to be a most dangerous one.

The importations of the soy bean into France is practically nil due to the high customs duty imposed upon it. Its chief use there has been in the manufacture of flour which is made into bread for consumption by diabetics, the medicinal qualities being considered as advantageous in diabetes, as the flour contains but a slight proportion of starch.

The Dutch have been slow to take up the soy bean among their imports but commercial circles in Rotterdam seem to feel confident that is has a great future for the reason that the oil is suitable for varnish manufacture, soap manufacture and for salad oil.

It is readily seen that this is a tremendous movement toward the substituting of soy bean products for cotton seed products in foreign markets. This means a greater demand for the raw material which naturally results in higher prices. Considering the fact that the cotton boll weevil may in a few years wipe cotton off the map unless his ravages are checked would it

not be wise for the Southern farmer to consider well the merits of the soy bean.

—C. H. LANE.

THE VALUE OF ALFALFA AS A HOG FEED.

The value of alfalfa as a hog feed is not very extensively known here in Tennessee; in fact, the use of any kind of hay seems to be rather foreign to our farmers, but in the more arid regions of the west where it is grown more extensively it has proven to be very economical. With its high per cent of protein it can supply the nitrogenous substances to fattening hogs cheaper than any other feed. Gains are made cheaper and it puts the hogs in a more healthy condition.

In a Kansas Experiment Station alfalfa was fed to brood sows as a maintenance ration and at farrowing time they showed a few pounds gain, after which the experiment was abandoned, the weights being of no value thereafter. From a packer's standpoint alfalfa fed hogs are the best; their hair is smooth and they are well finished with an even covering of flesh. From an internal view everything indicates health and thrift, their intestines are strong and as a butcher expressed it they feel like bicycle tires. The meat does not have that flabby texture but is smooth, firm and of a good color and taste.

It is from the feeder's standpoint that we are most interested and the first important point is the time of harvesting. The best results at the Kansas Experiment Station were from hay cut just before the blooming stage when the leaves were tender. It may be used as a forage crop, the best experiment being at the Mississippi Experiment Station, where pigs ranging from three to four months old were used and the results of two years' experiments show that alfalfa is no more than a maintenance ration for growing pigs, as well as brood sows, without a grain of food to supplement it. Satisfactory gains were secured from alfalfa pasture by supplementing the pasture with 1 to 2 per cent of the weight of the hog in corn or other grain. Corn is doubtless generally regarded as the standard feed for hogs in this country, but in Kansas Kaffir corn has proven useful and is eaten readily and relished for the first four months but is said to induce constipation and its effect on the appetite is attributed to this. In the Kansas Experiment Station 7.83 lbs. alfalfa hay and 1 bushel of Kaffir corn produced 10.88 lbs. pork, while 1 bushel of Kaffir corn meal fed alone produced only 7.48 lbs. pork. This shows very evidently the value of alfalfa for combining with Kaffir corn. In another experiment alfalfa was fed in connection with corn, 100 lbs. alfalfa producing as much fat as 96 lbs. of corn, 5 lbs. of corn producing 1 lb. of pork; 96 lbs. alfalfa producing 19 lbs. of pork. Alfalfa yielded 4 tons per acre, a meat production of 1,600 lbs. per acre. Another experiment carried on

during the summer 170 lbs. of green alfalfa cut and fed to hogs, producing the same gains as 100 lbs. of corn 6 lbs. of corn in this experiment producing 1 lb. of pork, 170 lbs. of alfalfa producing 16½ lbs. of pork, or a fraction over the same gains as 100 lbs. corn, 6 lbs. corn in this experiment producing 1 lb. of pork, 170 lbs. of alfalfa producing 16⅔ lbs. of pork or a fraction over 10 lbs. of alfalfa producing 1 lb. of pork. 1 acre of alfalfa is estimated to produce 20,000 lbs. of green hay which according to the above figures would produce 2,000 lbs. of pork. Of course this is fed in connection with corn. Using the results of the last two experiments, alfalfa hay yielding 4 tons (8,000 lbs.) per acre would produce 1,600 lbs. of pork which at 4 cents would be worth $64 per acre and green alfalfa hay producing 10 tons (20,000 lbs.) per acre would produce 2,000 lbs. of pork which at 4 cts would be worth $80 per acre. In another experiment an acre of alfalfa produced $20.20 worth of pork while an acre of rape fed to a similar lot of hogs only produced $10.05 worth of pork.

A 12 weeks' experiment at the Nebraska Station gave the following results:

Daily gain of .8 lbs. fed corn and bran in proportion of 3 of corn to 1 of bran.

Daily gain of 1.096 lbs. fed corn and shorts in proportion of 3 of corn to 1 of shorts.

Daily gain of 1.076 lbs. fed corn and cut alfalfa hay in proportion of 3 to corn to 1 of alfalfa hay.

Daily gain of 1.062 lbs. fed corn and ground alfalfa hay in proportion of 3 of corn to 1 of alfalfa hay.

Daily gain of .922 lbs. fed corn and cut alfalfa hay in proportion of 1 of corn to 1 of alfalfa hay.

Daily gain of .888 lbs. fed corn and ground alfalfa hay in proportion of 1 of corn to 1 of alfalfa hay

Smallest amount of feed per pound of gain was 4.66 lbs. fed corn and shorts, 3 to 1.

Largest amount of feed per pound of gain was 5.89 lbs. fed corn and bran, 3 to 1.

Amount of feed per pound of gain was 4.8 lbs. fed corn and alfalfa, 3 to 1.

Amount of feed per pound of gain was 5.5 lbs. fed corn and alfalfa, 1 to 1.

From the above figures the cost of a pound of gain ranged from 2.62 cents, with the lot fed corn and cut alfalfa 3 to 1, to 3.96 cents with the lot fed corn and ground alfalfa hay 1 to 1. The largest daily gain was made on corn and shorts 3 to 1 but a gain practically equivalent was made at a lower cost where cut or ground alfalfa was substituted for shorts. The cheapest gains were made on corn and alfalfa. Corn and alfalfa 3 to 1 prove better than corn and alfalfa 1 to 1.

In a 102 day experiment at the Missouri Station corn meal and blue grass gave a daily gain of .63 lbs.; corn meal and clover gave a daily gain of .77 lbs.; corn and alfalfa gave daily gain of .83 lbs.; corn meal and middlings gave a daily gain of .68 lbs.; corn meal and skim milk gave a daily gain of 1.61 lbs. The cheapest gain was on corn meal and skim milk, costing 2.83 cents per pound and the most expensive gain was on corn meal and middlings costing 4.07 cents per pound. On green feed the cost ranged from 3 cents on corn meal and alfalfa to 3.96 cents on corn meal and blue grass.

The experiments show where alfalfa is placed and its value as a hog feed. To the farmer this question of a more balanced hog feed is a great question. According to Director Waters of the Missouri Station, one of the largest single wastes comes from the too exclusive use of corn in growing and fattening hogs and the cheapest remedy is the use of forage crops in summer and the use of some home grown protein in winter. It is not safe or even desirable to rely upon a single crop excepting alfalfa when it is an assured success to furnish pasture for our hogs throughout the entire season.

—ARNALL PEERY, '10.

ALFALFA ON THE UNIVERSITY FARM.

At present the University farm has four separate alfalfa fields; two of these are small lots used for hog pasture, while the others are fields of only a few acres. However, the station is preparing several fields for this important crop, and, no doubt, before many years, alfalfa will be one of the main crops at the farm. The old adage, that a stitch in time saves nine, applies to alfalfa as much as to any thing else and unless the ground is thoroughly prepared and in the best of condition, we are sure to be disappointed in our results. On the other hand, if our labor and crops, preceding the alfalfa, have been planned with regard to the alfalfa crop, then we are sure to reap a bountiful harvest.

The following is the method used at the University farm:

In the fall of 1908, crimson clover was seeded to land intended for alfalfa. In the spring of 1909, about May 1st, the clover was turned under with 500 lbs. acid phosphate. The land was disced, harrowed, and limed with two tons of crushed lime stone rock. During the summer the land was kept fallow and in good tilth, a fact which prevented the growth of any weeds, grass, etc. About the latter part of August the land was seeded to alfalfa, 30 lbs. per acre being used. For the destruction of weeds, etc., starting in the newly sown field, the weeder was run over it when plants were about ½ inch in height. The time of cutting next spring (1910) will depend on the growth made. The first cutting is usually made in the early part of May, and later ones about every four or five weeks

till the middle of September or time to allow the alfalfa to produce a large enough growth before cold weather to protect it through the winter. After each cutting, discing is resorted to in order to open up the alfalfa and do away with any weeds, grass, etc., found in manure fertilizers, tankage and ground limestone. Before sowing this fall, part of one field was manured, and on this area we now find the alfalfa

PIGS IN THE ALFALFA PATCH ON THE UNIVERSITY FARM

doing much better than on any other part of the field. In manuring land for alfalfa, it would be wise to apply it in time for the weed seed to germinate and be destroyed before sowing the alfalfa.

From observations on the farm, we have come to the following conclusions regarding the growth of alfalfa.

The richest and best drained soils should be used; if not rich enough manure, fertilizer, etc., should be applied. In either case acidity, if present, must be corrected by a liberal application of lime. As a safe plan, the soil should always be inoculated with the alfalfa bacteria. The seed bed should be in the very best condition possible and should be seeded in the latter part of August, about 30 lbs. of seed per acre, without any nurse crop.

—JNO. F. FARROW, '10.

TOBACCO INSECT INVESTIGATION.

The Bureau of Entomology has accomplished no little in controlling ravages of insect pests. There is work being done in all parts of the United States and with all kinds of insects: Texas fever tick, cotton boll weevil, house flies, mosquitoes, etc. The tobacco insect investigation comes under the Southern Field Crop Insects division of the Bureau of Entomology.

The work was begun in the latter part of the summer of July, 1907. Some field observations were made by Mr. A. C. Morgan, who had been previously at work on the boll weevil project in Texas. Mr. Morgan got the lay of the country and located a laboratory and farms for experimental work. Some life history work was done and five or six hundred larvae were put into hibernation.

In the spring of 1908, two men were sent to Clarksville. The work began by making observations on flea beetles (Epetrix parvula) in the plant beds. The habits and environment of the beetle was studied as closely as possible in the field. Later an assistant was furnished by the State College of Agriculture. The work of the summer was mostly taken up by life cycle study of the horn worm (Phlegethontius-sexta and P. quinquemaculata) and their habits and environment. Two or three hundred of the larvae were bred in individual cages at the laboratory. Moths were collected from Jamestown patches and dissected to determine the number of eggs one individual was capable of laying. In the individual life history work the eggs were collected from the field and brought to the laboratory and as soon as they hatched the young larvae were put into individual breeding cages and fed and examined each day. The molts and time of molts were determined; and also, the length of the larval stage. When the larvae was large enough to pupate it was transferred to a pupating cage with glass sides; here the actions of the pupae were observed and the length of the stage determined. The adult was put into a cage and fed but no satisfactory results were obtained. All experiments were checked with the larvae and the other stages of the insect in the natural environment. All conditions were made as near natural as possible. Some insecticides were tested in the dust form. About seven thousand larva were put into hibernation. Observations were made on all insects feeding on tobacco and all animals parisitic or preying upon insects injurious to tobacco.

The season of 1909 was duplicated in the life history work. Some extensive work was done on the flea beetle and other insects found in tobacco. Four men were assigned to the work at Clarksville and a sub station with one man was established at Appomattox, Virginia. Some work was done in Florida on the thrips and bud worms on the shaded tobacco. At the beginning of the season an unsuccessful attempt was made to breed an egg

parasite introduced from Porto Rico, it was parasitic on the horn worm's egg. Several different insecticides were tried to determine the effectiveness on the horn worm and effect on the plant. Both dust and sprays were tried and several extensive field experiments were carried on in the fields near Clarksville. The attempt at breeding moths was more successful.

As a whole the work has been a success and a foundation for a good work has been established. Remedies cannot be definitely announced, as work of this character requires time and much study before the practical application of the investigation can be made. The purpose of this article is to give to the tobacco grower some idea of the work necessary to be done before the stage which most interests him—remedies—is reached.

Every farmer should take a greater interest in the insect work and should try to get every bulletin the Bureau of Entomology publishes and read them.

D. C. Parman, '11.

AGRICULTURE IN THE PUBLIC SCHOOLS.

There were forty-five pupils in my school last winter.

Before organizing a class in agriculture I talked to the school about agriculture in the public schools. I called their attention to old fields that were to be seen on their way to school, and I asked them if these old fields might not be made to produce something; so when we were ready to drop Khran's physiology and take up some new study I organized a class of nine pupils from the sixth and seventh grades. There were two text books on agriculture in the school at that time and as soon as I could go to town I purchased books to supply the class. I arranged to devote thirty minutes to agriculture immediately after the noon period. By this arrangement I had some time just preceding the class period to arrange for class work. Our first lessons were naturally on soils. We studied soil formation, soil depletion, soil improvement and the relation of different soils to moisture. For this study I prepared different soils before the class. We had clay in one place, sand in another, loam in another, and decayed leaves, three, two and one years old in other places. After studying these soils separately we mixed clay and sand, clay and loam and clay, sand and loam, and noted the difference of the coompositinn in color and texture. This gave a very impressive lesson on the value of "humus." To show the best soils to absorb our heavy rains we arranged the clay, sand, loam and humus (decayed leaves) in different piles and took equal measures of water to apply to each, and as the soils took up the water we poured on more. At another time I arranged soils in lamp chimneys that the pupils had provided. I tied thin cloths over the tops of the chimneys and turned them down in pans. In one I put finely pulverized clay; in another sand, in another clay with the central section cloddy; in another loam, and when the class was called we poured

water in each pan and watched for the result, as we proceeded with general discussions. The pupils were much interested in this experiment. They were surprised to see the water rise so rapidly in the sand, slower in the loam and so very slowly in the clay. At that time we had a lively discussion as to one in which the water would rise the highest. This experiment was set away to be watched at another time; so at the next class period some were surprised to see the water had risen in the one containing the clods, just to the clods and seemed to rise no higher. This led to an interesting talk on preparation of soils for planting. These experiments led to many lively discussions such as what are the best soils, and why our old fields wash so badly when "new grounds" do not; and this naturally led the class to see the value of "humus". These lessons led up to the subject of improving the worn down fields and pupils were made to see the need of growing cover crops to be turned under to restore "humus."

After some effort I secured a bunch of clover to use when we studied leguminous crops. The nodules were quite a show to some of the members of the class. Lessons on "crop rotation" followed. I drew on the board a map representing a farm divided into a number of fields and in each division we indicated a crop to fit in for a good rotation.

In a discussion some members of the class asked the question why some crops grew well on certain pieces of land when other crops would be failures; and this brought us to a consideration of acid soils as well as other causes for the failure. To show the class how to test the soil to determine whether or not it was acid I got some blue litmus paper and we prepared a mixture of soil in rain water (not well or spring water, for either may be more or less acid), into which I put a piece of the blue litmus. The litmus turned red which proved the soil was acid. This led us to naming crops suited to acid soil and crops suited to neutral soil.

At other periods we discussed commercial fertilizers and "live stock farming. This led us to considering how most farmers care for their stock, and how they lose the greater percent of fertility in the "barn yard manure" by letting it lie out in the rain. We got a nice problem comparing commercial fertilizer and cotton seed meal as a fertilizer. Besides this some pupils wrote short compositions on such topics as "The Needs of the Farmer" "The Care of the Home" "The Care of the Farm" and "A Good Farmer." The importance of caring for orchards, farm tools and the farm stock was considered with much interest by the pupils.

In the library I placed a number of Agricultural bulletins and U. T. Farmers and some copies of another agricultural paper and at meeting of the patrons I handed these out to be read and returned. This was done with much interest.

W. J. FORBESS.

THE CONTROL OF PEACH ROT.

At the University Fruit Farm during the past summer an experiment was carried on to test and compare the efficiency of Bordeaux mixture and Self boiled lime sulphur wash in the prevention and control of peach rot. Peach rot is a fungus disease affecting the fruit by making small brown spots at first but which develop until the whole fruit is ruined. The distribution or spreading of this disease is effected by the liberation of small spores from these brown spots which are carried through the air and fall upon other fruits. Rainy weather in the summer aids the development and distribution of these spores and for this reason the loss is greater than in a dry season. This disease can be controlled by the use of sprays and in this experiment Bordeaux mixture and Self boiled lime sulphur wash were used.

In preparing Bordeaux mixture care must be used in taking the right amounts of copper sulphate, lime and water, because copper sulphate is injurious to the foliage unless applied in a very weak solution. It is prepared as follows:

1. Dissolve ¾ lb. of copper sulphate in 25 gallons of water, using a stoneware or wooden vessel. 2. In a barrel slake 10 lbs. of hard stone lime thoroughly and dilute to 25 gallons, stirring well until all the lime is dissolved. 3. Strain the copper sulphate solution into the lime solution in spraying barrel and apply as soon as possible.

Self boiled lime sulphur wash is prepared as follows: 1. Have 10 gallons of hot water ready. 2. Slak 15 lbs. of hard ston lime in a barrel with 2 or 3 gallons of hot water. 3. As soon as slaking is well under way sprinkle 10 lbs. of sulphur into the solution. 4. Throw a sack over the top of the barrel, and stir well, adding boiling water as necessary to keep from burning. 5. Let boil exactly five minutes then fill barrel with cold water. 6. Strain into spraying barrel and apply.

In testing the sprays 54 trees were used including six different varieties, 9 trees of each. Each varity of trees was divided into 3 groups, the first not sprayed at all, second sprayed four times with Bordeaux and the third sprayed four times with lime sulphur wash. Following is a list of the varieties used, arranged in the order of maturity of fruit. Carman, Family Favorite, Champion, Belle of Georgia, Elberta, and Stump the World.

On July 16 the Carman peaches were ripe and a counting of the good and rotten ones showed a loss of 67% on unsprayed trees, 40.2% on Bordeaux sprayed trees and 21.6% on trees sprayed with Self boiled lime sulphur wash.

On July 17th the Family Favorite and Champion trees were examined and all the rotten peaches knocked off and counted. This operation was repeated daily, except Sundays until August 2nd, when all the peaches were ripe. In the Family Favorite variety there was a loss of 99%, 37% and 48% on unsprayed, Bordeaux sprayed and lime sulphur sprayed trees re-

spectively, and a loss of 63.8%, 54% and 41% on unsprayed, Bordeaux sprayed and lime sulphur sprayed trees of the Champion variety.

The Belle of Georgia trees were examined in the same manner from July 20th to August 2nd and loss of 100% on unsprayed trees recorded. 93% on Bordeaux sprayed and 71% on lime sulphur sprayed trees. In the Stump the World and Elbertas the losses were 19% unsprayed, 11% Bordeaux sprayed and 12% lime sulphur sprayed trees in Stump the World's and 40%, 24% and 37% on unsprayed, Bordeaux sprayed and lime sulphur sprayed respectively of the Elbertas.

An average of the losses in the six varieties showed: 70%, 43% and 40% on unsprayed, Bordeaux sprayed and lime sulphur sprayed respectively or an advantage of 27% in favor of Bordeaux and 30% in favor of lime sulphur wash.

At the beginning of the season the 54 trees would have averaged about 2¾ crates each or 148 crates of fruit worth $1.60 per crate would have brought $236.80 had none been lost through rotting.

Had no spraying been done the crop would have been worth only $71.04. By applying Bordeaux mixture 4 times the crop would have been worth $138.98 or by the use of Self boiled lime sulphur wash, would have brought $142.08.

The total cost of applying either mixture to all the trees need not have exceeded $15.00, leaving a net profit of $48.94 in favor of Bordeaux and $56.04 in favor of Self boiled lime sulphur wash.

This experiment plainly shows the value of these sprays in the control of this disease without considering their effect on other fungus diseases and insect attacks at the same time. The lime sulphur wash proved very effective in keeping down the black spot disease which causes the peach to crack open, but the Bordeaux had very little effect on it. Self boiled lime sulphur wash is cheap, easily handled, a very effective fungicide and insecticide and has very little harmful effect on the foliage of the tree.

—G. R. WORTHINGTON, '10.

EDITORIALS.

The Agricultural Club has this year adopted a new plan of programs for its regular bi-weekly meetings. This plan consists of informal discussions of live agricultural topics as found each week in the leading agricultural papers.

The old system of a formal program of debates, essays, etc., on stated topics by certain members of the club or by visitors has not proven satisfactory. The ideal club meeting is one which every one may thoroughly enjoy; not a place where one is put to sleep by a boresome lecture, not a place where orators are made nor where amateurs must undergo the painful ordeal of making speeches but a place where every member will feel very much at home, where every discussion is informal and while highly enjoyed there is still the feeling that the time has been well spent.

One of the strong points in favor of this plan lies in the fact that it will encourage the habit of reading good papers and will greatly assist the student in acquiring the ability to readily recognize in the things he reads those things which are of real worth to him.

* * * * * * * *

College life still shows evidences of serious weakness in the University along one line especially. There is a lack of unity among the students which must be remedied before we can ever hope to acquire an enviable amount of college spirit. There must be found in every student a constant purpose of defending every action, of supporting every movement and of boosting every claim of the University before we may boast of our loyalty to our institution or hope to receive recognition by the world. The tendency to form cliques is a source of much evil at present in the University and this is not alone confined to fraternities but the members of the different departments of the University often seem to forget that they constitute in reality but a small part of the University and strive selfishly for their departments even to the detriment of the greater body.

Let us remember that our first duty is to our University; that if we can play football or can startle the world by our oratorical or argumentative powers it is our duty first to consider the welfare of our institution and make our most earnest efforts to class it as the best in the world, rather than to settle down in our own particular department and strive to make it eclipse the others. How much nobler a purpose and how much greater honor awaits him who does this.

To the student of Agriculture the above applies most forcibly. We have made our appearance into the University very abruptly. But a few years ago an "Ag" student was a joke. Our increase has been phenomenal. May our presence not be obnoxious to the University, but may we enter into every activity of college life with a spirit and zeal which shall command the respect of every other department and shall receive a frequent glance of approval from our guardian, the University.

* * * * * * * *

In this issue appears the announcement of the Short Course in Agriculture. These annual courses have become permanently instituted in the University and are just now beginning to be appreciated as they should be. The attendance each year has shown an increase of from 25 to 50 per cent over the preceding year until last year the number had grown sufficiently large to seemingly justify the efforts of the faculty in preparing the courses. But the limit of good which may result from these courses has not even been approached. There are hundreds of farmers within the State, who have had but limited opportunities of learning the foundation principles of their business and as many more of their sons who will attempt to take up their father's vocation without a college education, who, if they could only be made to realize the great opportunities offered in these courses might profit exceedingly by a few weeks stay in the University this winter.

Let us endeavor to make the course this year the most largely attended by the most representative body of students of any in the history of the courses. For in so doing we are not only advertising our University but also advancing the cause of Agriculture in the state.

* * * * * * * *

The latest bulletin of the University Experiment Station is just out. It is entitled: The Relation of the Weather Service to the Farmers of Tennessee, and was written by Mr. J. F. Voorhees, consulting meteorologist of the Experiment Station staff and who also has charge of the U. S. Weather Bureau Station in Knoxville. Mr. Voorhees has done much work in an effort to bring the work of the Weather Bureau into closer touch with the farmers of the State, and this bulletin contains many observations with regard to temperature and rainfall with which the up to date farmer should be familiar.

CREAM OF THE RURAL PRESS.

The first fundamental principle we must learn is to do better plowing, and to do it earlier. If the Southern farmer would break the larger portion of his lands deep in the fall and early winter, and sow them down to some cover crop to protect them from the washing rains and other elements; and then turn these crops under in the spring, he would soon see the effects on the lands, and the crops grown upon them—*Southern Agriculturist.*

A couple of years ago the Iowa Experiment Station sent out letters of inquiry to all parts of the State as to the actual cost of shredding fodder, with the following results:

The average cost of machinery for shredding at that date was $1.55 per acre; cost of fuel, 31.4 cents. The total cost for shredding per acre varied from $2.45 to $6.65 This is a very wide range, owing to the varying conditions, such as distance to be hauled, the yield per acre, the size of machine used, the work required in handling the outfit, as well as the condition of the fodder and accidents to the machine.

The average cost of shredding 1,600 acres was found to be $4.41 per acre. The estimated yield of corn per acre was 57.25 bushels, which is rather high even for Iowa. The yield of fodder was two tons to the acre, and the cost of husking in the field 5 cents per bushel. On this basis the station figures the cost of shredding the fodder at 77 cents per ton.—*Wallace's Farmer.*

In the first place it should be clearly understood that the great aim of breeding is to produce animals; secondly, animals of as high practical value for the actual uses of man's consumption as possible; thirdly, that where a standard of excellence has already been attained by earlier breeders and improvers, this standard should be carefully maintained and fourthly, that whenever and wherever it may be possible, this standard should be advanced and the breed improved. A man who breeds valuable varieties of stock should never forget that they are a trust committed to his charge and that a neglect of any opportunity to improve on them is to prove false to a high trust."—*Hoard's Dairyman.*

In an experiment credited to the Michigan station, an accurate account was kept of the expense of feeding a dairy calf for one year from its birth. The amounts of feeds used in that time were 381 pounds of whole milk, 2,568 pounds of skim milk, 1,262 pounds of silage, 219 pounds of beet pulp, 1,254 pounds of hay, 1,247 pounds of grain, 147 pounds of roots, 14 pounds of alfalfa meal and 50 pounds of green corn. The grain ration consisted of three parts each of corn and oats and one part of bran and oilmeal. At the end of the year the calf weighed 800 pounds at a cost of $28.55 for feed. The calf was a Holstein.—*Twentieth Century Farmer.*

One of the most successful Berkshire breeders in America declares that he was induced to engage in the dairy business by a study of the feeding

value of skimmed milk. Desiring to grow his pigs strong in bone and constitution, and to develop them rapidly he began to buy up good, practical dairy cows. He now has a considerable herd, and all that he believed would follow the use of milk in pig feeding has been realized. Pigs raised on skim milk and otherwise properly cared for are so much better than pigs grown the ordinary way that there is no comparison.—*Berkshire World.*

The education of the consumer is practically as important as the education of the producer, and until they learn to appreciate clean milk and are ready to pay a reasonable price for it, just so long are they encouraging uncleanliness, the keeping of diseased cows, and the watering and doping of the product. The consumer is therefore fully as much to blame for the present quality of milk as the producer. There is need of improvement all along the line. The boards of health must employ competent inspectors to instruct and bring about a better condition on the dairy farms. The dairymen must appreciate more than they have in the past the great importance of producing clean milk, free from disease and contamination, and the public must be educated to demand clean milk from clean dairies, and foot the bills for this improvement.—*Ohio Farmer.*

On most farms the dwelling house is placed near the highway. It is not the most desirable arrangement, for the dust from the road invades the house, and there is little privacy. It is a mistake to think that home means a house only. It should mean also the house lot. One should be able to enjoy life in the shade of the trees during the long summer days with the same sense of privacy that one feels within the house. At the same time the yard should be open to sun and breeze. It should be essentially a great out-of-doors sitting room, beautiful and restful, well furnished and roomy. Every good object within the horizon should be visible from the home grounds, and every unsightly object should be concealed.—*The Progressive Farmer.*

Short Course in Agriculture

AT THE

University of Tennessee

DIVIDED INTO FOUR TWO-WEEKS COURSES

January and February, 1910

Tuition free. No entrance examinations. Courses may be taken singly or as a whole. Open to everybody sixteen years of age or over who can read and write.

THE COURSES

Course I—Jan. 3-15—Soils, Fertilizers, Farm Crops

Professors Mooers, Bain, and Morgan

The morning hours are devoted to lecture and class work on soils, their structure and elements; kinds of soil adapted to various farm crops; tillage; barnyard manure; commercial fertilizers, their elements and value; plant food required for certain crops; rules for mixing fertilizers; the leading farm crops of Tennessee; diseases of farm crops; insects injurious to farm crops.

The afternoons are devoted to the judging of corn and other cereals, inspection of plots at the Experiment Station farm, and visits to the best farms in the neighborhood of Knoxville.

Course II—Jan. 17-29—Live Stock
Professor Morgan, Dr. Jacob

Lectures and class-room exercises on breeds of stock, including horses, cattle, sheep and hogs; feeds: the management of forage crops; the composition of food stuffs; feeding to produce the best results at least cost; nutritive ratio; problems in making rations, etc.; diseases of live stock, with treatment.

The afternoons are devoted to the judging of horses, beef cattle, sheep and swine.

Course III—Jan. 31-Feb. 12—Dairying
Mr. Denniss

Lectures and class-room exercises on the dairy breeds; composition of milk; rations for milk cows; forage and ensilage crops, silos; testing dairy cows; testing milk by the Babcock test; separators, dairy machinery, etc.

The afternoons are devoted to work in the dairy barn and creamery, every student having practice in the care of boiler and engine, separating milk, churning, butter working, and all operations connected with the dairy.

Course IV—Feb. 14-26—Truck and Fruit Growing
Professor Keffer

The morning hours are devoted to lectures on the leading truck crops—potato, tomato, cabbage, melon, etc.; hotbeds; cold-frames; seedage; transplanting; small fruits; grapes; orchard fruits; orchard management—tillage, pruning, spraying, harvesting, root-grafting, top-grafting, and budding.

The afternoons are occupied with practice in pruning trained and neglected grapevines, peach, apple and other trees, and in spraying.

EQUIPMENT

The Experiment Station farm of the University of Tennessee is one of the best in the United States. The extensive plots and the splendid condition of the fields and meadows afford every opportunity for study and for illustration. Experiments in feeding beef cattle (high-grade Shorthorns) will be in progress at the farm and fine examples of the best breeds of dairy cattle, sheep, and hogs will be available for use in stock judging. The dairy barn, dairy laboratory, and silos give unusual facilities for the study of dairying.

The experiment orchard and vineyard contain the leading commercial fruits, and are used freely in instruction.

Morrill Hall, in which Short Course lectures are given, is the newest and best building on the University campus, and contains a large agricultural library, to which the students have free access.

In addition to the facilities provided by the University, excursions to farms, market gardens, orchards and dairies are arranged for the Short Course students.

PRIZES

Prizes will be awarded to individual students for the best work in the different courses, as follows:

$10.00, awarded for proficiency in judging light horses; given by Hon. Edward T. Sanford, Knoxville, Tenn.

$10.00, awarded for the best essay on "The Value of Commercial Fertilizers in the Building Up of Poor Land"; given by the Virginia-Carolina Chemical Co., Atlanta, Ga.

$10.00, awarded for proficiency in nitrogenous fertilizers; given by Mr. Wm. S. Myers, Director of the Nitrate Propaganda, New York, N. Y.

$10.00, awarded for proficiency in feeds and feeding; given by Messrs. J. Allen Smith & Co., Knoxville, Tenn.

$10.00, awarded for proficiency in the handling of cream separators; given by the DeLaval Separator Co., New York, N. Y.

$10.00, awarded for proficiency in judging beef cattle; given by Messrs. Davis & Susong, Knoxville, Tenn.

$5.00, awarded for proficiency in Horticulture; given by Hackney, Broyles & Lackey Co., Knoxville, Tenn.

$10.00 worth of advertising space in the Industrious Hen, awarded for best article on farm poultry; given by the Industrious Hen Co., Knoxville, Tenn.

One Pure-Bred Berkshire Pig—male, sired by great grand champion Premier Longfellow's Rival (101678), by Premier Longfellow, grand champion at the World's Fair at St. Louis—awarded for proficiency in breeds and breeding; given by Mr. J. D. B. DeBow, Nashville, Tenn.

One 8-inch feed grinder, value $35.00, awarded for proficiency in home-grown rations for dairy and beef production; given by the International Harvester Co. of America, Knoxville, Tenn.

One plow, awarded for proficiency in soils, fertilizers, and crops; given by The Wm. J. Oliver Manufacturing Co., Knoxville, Tenn.

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Christmas Carol

So now is come our joyfulst feast,
    Let every man be jolly;
Each room with ivy leaves is drest,
    And every post with holly.
Though some churls at our mirth repine,
    Round your foreheads garlands twine;
Drown sorrow in a cup of wine,
    And let us all be merry.

Now all our neighbors chimneys smoke,
    And Christmas logs are burning;
Their ovens they with baked meats choke,
    And all their spits are turning.
Without the door let sorrow lie;
And if for cold it hap to die,
We'll bury't in a Christmas pie,
    And evermore be merry.

Ned Squash hath fetched his bands from pawn,
    And all his best apparel;
Brisk Ned hath bought a ruff of lawn
    With droppings of the barrel;
And those that hardly all the year
Had bread to eat or rags to wear
Will have both clothes and dainty fare,
    And all the day be merry.

—George Wither.

THE U. T. FARMER

Vol. IV. DECEMBER, 1909. No. 3

RATIONS USED ON THE UNIVERSITY FARM.

On the University farm are kept a herd of 30 dairy cows, 26 jerseys, 24 of which are registered and 4 Holsteins, 1 or which is registered; a registered Jersey bull, 12 work horses and mules and 40 hogs, 6 of which are brood sows, 2 boars and 32 pigs. It will doubtless be of interest to many farmers to know just how all this stock is maintained, the materials fed and the cost of the rations used. It will be well to state in the beginning that an effort is made to produce on the farm as near all of the materials used as possible and in a great many instances they have found it profitable to substitute some home grown product for a high priced concentrate.

The herd of dairy cows are allowed the run of a blue grass pasture, though at present the pasture is very short, due to continued dry weather. In addition to this they are fed a ration consisting of corn silage, soy bean hay, Peerless mill feed and cotton seed meal. The cow silage and soy bean hay are raised on the farm. The Peerless mill feed is a manufactured product consisting of a mixture of wheat bran, wheat middlings, wheat screenings, corn bran, corn meal and corn screenings. The cotton seed meal is used to balance the ration without making the total amount of feed so bulky that the animal will not consume it. In determining the amount of each ration to be fed to each individual of the herd, the following method is pursued: First they take these materials and mix them in such proportion as to form what is called a maintenance ration, *i. e.*, a ration sufficient to keep an animal of a certain weight in a healthy, vigorous condition. For instance, it has been found that an average dairy animal weighing 1,000 lbs. requires 23 lbs. dry matter, 2 lbs. Protein, 11 lbs. carbohydrates and 4 lbs. fat per day just for the maintenance of its bodily health and vigor. Hence to maintain an animal on the above mentioned feed stuffs the proportions used would run about as follows:

	Digestible nutrients in the number of pounds.			
	Dry Matter	Protein	Carbohydrates	Fat
Corn silage 40 lbs.	8.40	.36	4.44	.32
Soy bean hay 14 lbs.	12.41	1.51	5.41	.21
Peerless mill feed 1 lb.	.87	.15	.58	.40
Cotton seed meal 1 lb.	.92	.37	.17	.13
Totals	22.60	2.39	10.60	1.06

Nutritive ratio is 1 :4.5.

Before going further, it will be well to make clear what is meant by balancing a ration. It has been clearly proven that in any feed which allows of economical use, the amount of protein contained therein must bear a definite relation to the amount of carbohydrates and fats. Experiments have shown that the proportions for mature animals should be about one pound of protein to six pounds of carbohydrates and fats, hence any ration used should approximate these amounts, The relation of these components to each other in a ration is spoken of as the Nutritive Ratio.

In compounding these rations the exact weights of every animal is not taken but an average of the herd, making sufficient allowance for the largest individuals.

After this ration has been fixed the matter of real importance from the profit standpoint confronts them. All of the cows do not produce the same quantity of milk and their milk tests very differently in the percent of butter fat. They can not afford to feed the animal that produces only 10 lbs. of milk per day as much as the one that produces 30 lbs.

The maintenance ration is accordingly modified so that the amount of food each individual receives depends directly upon her production of milk. The object being to make every animal consume all that she will profitably. A table has been worked out based on a series of experiments showing the amount of food nutrients required by a cow when producing daily different quantities of milk. It is as follows:

Pounds of Milk	Dry Matter	Protein	Carbohydrates	Fats
11. lbs. milk per day	25 lbs.	1.6 lbs.	10 lbs.	0.3 lbs.
16.6 lbs. milk per day	27 lbs.	2.0 lbs.	11 lbs.	0 4 lbs.
22.0 lbs. milk per day	29 lbs.	2.5 lbs.	13 lbs.	0.5 lbs.
27.5 lbs. milk per day	32 lbs.	3.3 lbs.	13 lbs.	0.8 lbs.

(This is for a 1,000 lb. cow.)

By the aid of this table the ration is modified to meet the milk production requirements of each animal. For instance, No. 7, a Holstein, weighing about 1250 lbs. and producing 24 lbs. of milk per day is allowed approximately 60 lbs. silage, 18 lbs. soy bean hay, 1 lb. Peerless mill feed and 2½ lbs. cotton seed meal while No. 1, a Jersey weighing about 800 and producing now but 15 lbs. milk per day is allowed 40 lbs. silage, 12 lbs. soy bean hay, 1 lb. Peerless Mill Feed and 1 lb. cotton seed meal per day. As mentioned before, the rations are not worked out exactly for each individual but they are divided into groups according to their weights and production and a ration worked out for each group.

This may strike the average farmer as being entirely too complicated to be practical and the writer would not advise the average dairyman to use the same degree of exactness employed at the Station farm, where accurate records must be kept, but every man who keeps cows should know each individual in his herd, so he can tell whether or not she is making him a profit or whether he is just feeding her because of a fancy he has taken to her.

The matter of weighing feeds each feeding time for every individual in the herd will doubtless not meet the approval of many farmers, due to the fact that a great deal more time would be required. As a matter of fact, there is no necessity of weighing the roughage used, such as silage and different kinds of hay. The animals should be allowed all of these they will clean up, but since there is such a great difference in the feeding value of different materials, it is very essential that the feeder should have some idea of the comparative values of the more common ones. For instance, a cow might be allowed all of the timothy she could eat and still be far from well fed because the food nutrients of timothy do not satisfy her requirements. In feeding concentrates such as cotton seed meal, bran and the like, enough time can certainly be taken to measure rather accurately the amounts fed, in fact, one cannot afford to feed such high priced materials under any other conditions. The ration used at the Station is slightly narrow, having a nutritive ration of 1:45, but where good care is taken of the manure produced by a herd, there is but slight loss in feeding an excess of nitrogenous matter, since 85 to 90% of the fertilizing value of a food is recovered in the manure, provided it is properly cared for and applied to the land.

The herd bull is kept in a lot especially built for him and is fed on what is not eaten up by the cows with the addition of enough grain to balance his ration.

The corn silage used costs approximately $2.00 per ton to grow, harvest, etc., or 2 cents per day per cow. The soy bean hay costs $3.00 per ton to produce or 6.6 cents per cow. The Peerless mill feed costs $30.00 per ton or 1½ cents per cow per day, and cotton seed meal $32.00 per ton or 1⅗ cents per cow daily, making the ration cost on an average of less than 19 cents per day. The average production of the herd (23 cows now being milked), is about 596 lbs. per day or 32.2 lbs. butter fat per day, which sells at 45 cents per pound butter fat leaving a profit of 63 cents per cow per day or for the herd $14.49 per day. Deducting the cost of the ration for 31 head (counting the bull), at 20 cents per head or $6.20, and the labor of three men employed in caring for the herd of $3.00 per day leaves a net profit of $5.29 per day.

The work horses are fed the following rations at present:

10 lbs. corn, costing 11 cents.

3 lbs. cotton seed meal costing 4.7 cents.

6 lbs. corn and cob meal costing 9 cents.

15 lbs. soy bean straw costing 2¼ cents.

17 lbs. sorghum from shock costing 1.7 cents.

A total cost of only 27.4 cents per head per day.

Since the whole farm is kept constantly in cultivation there is scarcely any grass hay produced, however, quantities of oats and vetch and wheat and vetch hay are fed.

The hogs are fed on a variety of feed stuffs. Brood sow No. 1, which now has a litter of 11 pigs is being fed 8 lbs. of a mixture of tankage and shorts in the proportion of 1 to 12 and in addition to this is allowed the run of an alfalfa pasture. Brood sow No. 2 with no pigs is being fed 5 lbs. of a mixture of soy bean meal and shorts in the proportions of 1 to 6 and is also allowed to run on alfalfa pasture.

The herd boars are fed tankage and shorts and the run of alfalfa pasture. The remainder of the herd tankage and shorts, and are allowed to run on barley and clover pasture. The use of winter pasture is found very satisfactory and economical in fattening hogs. At the Station farm two pasture lots were sown, one sown August 26 to one-half wheat and clover and other half barley and clover. The other lot was seeded June 12 to barley and crimson clover. The hogs are allowed the run of one lot one week and are then changed to the other for a week. In the lot containing both wheat and barley, the barley seems to be eaten closest, indicating that it is liked better by the hogs. The clover on the lot of wheat and barley did not get a very good start. It has kept 15 head of hogs busy eating off the barley in these two quarter acre lots since the 1st of October.

—Judd Brooks, '12.

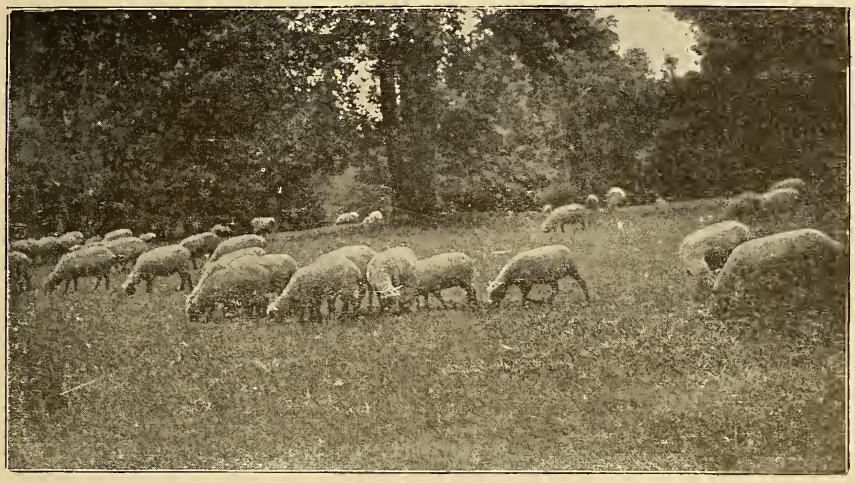
Editor's Note—The above article should be read in connection with the article on "The Double Cropping System on the University Farm," which appeared in the October issue of the Farmer to be rightly appreciated. There is now being kept on this farm one animal for practically every acre of ground cultivated in general farm crops and the maintenance of such an unusually large number of animals is made possible only by the double cropping system of farming and *vice versa,* it is possible to use the double cropping system only when a large number of animals are kept to utilize great quantities of roughage and make possible the returning to the land of a large percent of the fertility removed by the crops, in the form of manure.

SHEEP RAISING IN TENNESSEE.

Sheep raising has never yet been given the consideration it deserves in Tennessee. On many farms there has not been a flock of sheep within one's memory, but there are farmers within the State who have been raising sheep profitably for many years. These farmers find that they get enough better results when they provide for them good pastures and shelter for bad weather to well pay for the trouble. Following is the method employed by a farmer who has found the breeding of pure bred sheep profitable.

The ewes are all registered and nothing but first class registered bucks are used. They are turned on grass during the month of August with the buck. Here they are allowed to remain until about the first of December

when they are brought to the barn so that the ewes may be in good condition by lambing time. The buck is now separated from the ewes as a ewe bred this late will lamb too late to allow the lamb to be profitably raised. At night the ewes are placed in a stable, well bedded with straw or other suitable material. They are fed a mixture of two parts bran, to one part corn, twice a day just outside the stable. Every night the racks in the stable are filled with clover or alfalfa hay. During the warm part of each day they are allowed to run in a pasture or clover field where they can graze but especially for exercise. Where ewes are confined and do not get plenty of exercise the lambs are born weak and often a large percent die.



SILENTLY MUNCHING THE SUCCULENT BLUE GRASS.

In January the ewes begin to lamb and they are looked after more closely. As soon as a ewe has a lamb she is placed in a small pen by herself or with several others which have lambs. When the lambs are two weeks old they are put back in the pen with the flock to make room for other ewes just lambing. Sometimes a ewe does not give enough milk and the lamb must be fed from a bottle until its mother can give enough milk to support it. On all sunshiny days the flock is turned out for fresh air and exercise. When the lambs get large enough to eat they are fed bran and a little cotton seed meal twice a day in a small pen with an entrance through which the lambs may go and come at will but which keeps the old sheep out. As long as the wheat fields may be pastured without injuring the crop too badly the ewes and lambs are allowed to run on them during the day and at evening are brought up, stabled and fed. They are not allowed out in the cold rains and on bad days are kept in the stable nearly all day. In April they are turned into a clover field or blue grass pasture and by the middle of May, when the nights have become warm they are no longer brought up at night but are allowed to run in the woodland in addition to pasture. They

are changed from the blue grass pasture to orchard grass and back about every two weeks. In this manner they are kept on pasture until about the first of July when the lambs are ready to wean. The lambs are brought nearer the house so that they may receive better attention. They do not graze much during the day but are driven up mornings and evenings and fed a mixture composed of equal parts of bran, corn and oats. Clover fields orchard grass and blue grass are used principally as pasture. Sometimes they are turned into the corn fields to eat off the lower blades. They are changed from one pasture to another about every ten days or two weeks, to lessen the danger of attacks from the stomach worm as much as possible.

The stomach worm is the greatest drawback to the sheep industry in the South. Both the old sheep and the lambs become infected but the old ones are generally strong enough to resist the attacks much better than the lambs. As a preventive of this parasite the sheep are fed quantities of tobacco. Four handsful of tobacco to one of salt are placed in boxes in the pastures for the old sheep. The same mixture is put in the stable so that the lambs may have access to it every morning. The lambs like it so well that often they will go to it before they get their breakfast. The tobacco, however, is not an absolute remedy and when it does not give relief the gasoline treatment is used. This treatment is as follows: After allowing the sheep to fast 12 or more hours it is given one tablespoonful of gasoline in three ounces of sweet milk. The mixture is well shaken and the lamb drenched with it care being takn not to strangle it. Some of the lambs die regardless of all effort to save them but by the use of tobacco and gasoline the number of deaths is not nearly so great as formerly.

This farmer sells all his lambs for breeders. In August some of the largest rams are sold at prices the mutton lamb never reaches but the owner prefers to keep them until the next spring and sell them as yearlings. At a year old he has no difficulty in selling them at a better price. Practically all the ewes are kept to increase the flock but he sells a few yearlings and two year old ewes.

Here is a man who has made money as a sheep breeder and while it would not be advisable for every farmer of Tennessee to become a sheep breeder yet the Spring lamb market offers him exceptional opportunities because with our comparatively warm winters and great variety of pasture and forage crops it would be possible for us to place a lamb on the market equal in size and quality to any produced by the more northern states, at least two weeks earlier than they can and at a less expense for feed and shelter. This should interest us especially since it is the early lamb that commands the biggest price.

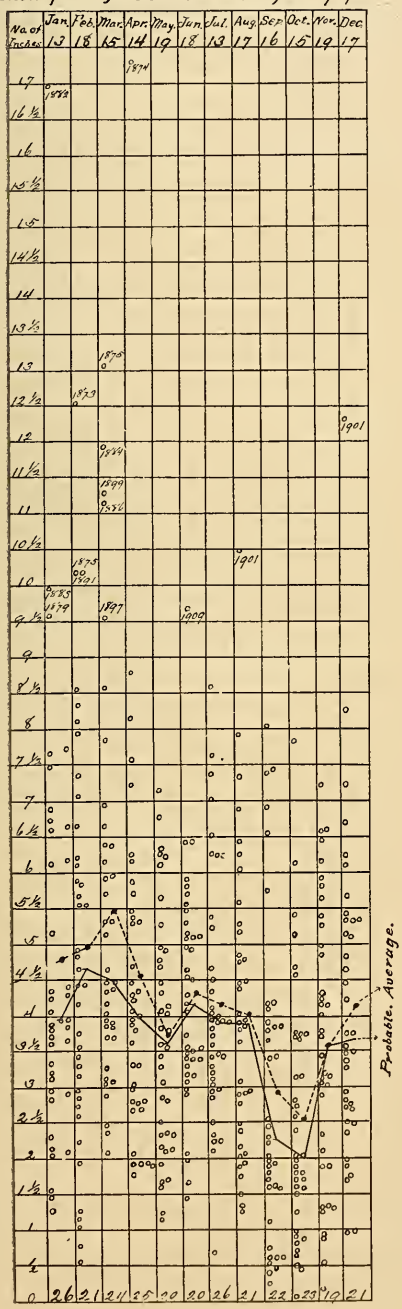
—Paul P. Hite, '13.

A STUDY OF THE RAINFALL OF 1909.

There is a general impression in this section and also in other sections of the country that the distribution of rainfall during the summer season

CHART XIII

Monthly rainfall at Knoxville for 39 years



MONTHLY RAINFALL, 1909.

January	3.17
February	7.05
March	5.98
April	5.70
May	4.14
June	9.68
July	7.01
August	3.17
September	2.91
October	1.61
November	0.91

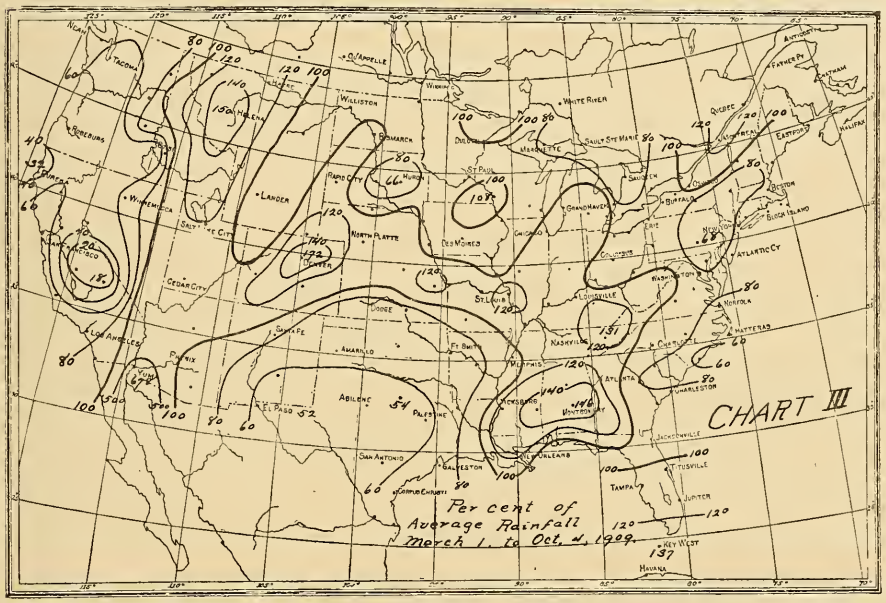
of 1909 has been extraordinarily uneven. Let us see whether or no this impression is justified by the facts. During the season from March 1 to October 4, 1909, 38.59 inches of rain or 131 percent of the average rainfall fell at Knoxville. This amount has been exceeded three times during the past 39 years.

The first five months, March to July, were wet, but June was the only month to exceed all former records. The June rainfall was 9.68 inches or 50 per cent greater than the previous maximum for June which was 6.44 inches in 1901. August was dry but has often been much dryer while in September the rainfall was slightly above normal. The longest period without rain was August 17, to September 3, or 18 days. This has been exceeded 10 times. While the number of days with rain during the wet months was greater than usual it has often been exceeded. Even June with 17 rainy days has had a greater number five different times. In August there were only 7 days with rain but in 1896 this month had but 4 rainy days.

The chart of monthly rainfall at Knoxville for 39 years, which represents very fairly the monthly distribution of rainfall for the state, shows graphically for each month the variation in the amount of rainfall during a period of 35 years. There is a column for each month and in each column there is a circle for each year. Each circle represents the rainfall for one month in one year. In the January column we find circles representing amounts from 1.25 inch to 17 inches as shown by the figures at the left. In the same manner the variation in rainfall is shown for each month in the year. In the table beside the chart is the monthly rainfall for 1909 from

January to November. By plotting the amount for any month in the proper column we can see at a glance just how that month compares with the same month in previous years.

There is one more feature to consider. There have been years with greater rainfall and years with more rainy days but as a rule there are occasional periods of a week or ten days when the farmer can work on the land. This year there occurred between April 20 and July 16, only one dry period as long as four days. It was this unusual distribution rather than the amount of rain or the number of rainy days that interfered so seriously with the planting. cultivating and harvesting of crops in East Tennessee.



Extending our outlook now from East Tennessee to the whole country we find very great differences in the distribution of rainfall. While many sections had 120 or 140 per cent of the average rainfall and one station in Arizona had 678 per cent. There were large areas where the rainfall was only 80 or 60 per cent of the average and one point in California had only 18 per cent. The relation between the average rainfall and that of 1909 is shown clearly by Charts 2 and 3. Chart 2 shows the average rainfall in inches from March 1 to October 4. The amount shades off from 40 inches in the southeast to less than 10 inches on the western plateau and increases to over 30 inches in the vicinity of Puget Sound.

Chart 3 showing the rainfall for 1909 for the same months presents a very different distribution. The regularity of Chart 2 has disappeared and we have only irregularity. We find regions with normally low rainfall as

west Texas or southern California with only half or less than half the usual rainfall while other dry regions as western Montana and Southern Arizona are unusually wet. We find some sections that are usually wet, as Mississippi and Alabama, much wetter than usual, while in the Carolinas, where the average rainfall is also high, it has been unusually dry.

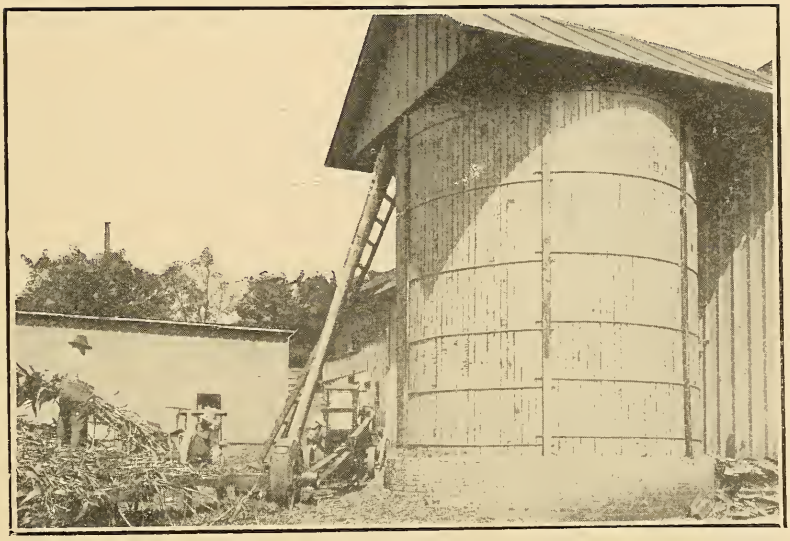
This study of rainfall should impress on the mind the great value to the farmer of the long series of meteorological records that is being accumulated by the U. S. Weather Bureau. The farmer needs to know the averages to help him in determining the crops to be grown and as a foundation for his crop rotations. He needs to know the extremes of drought and wet, heat and cold, so that he can make his rotations flexible enough to meet all probable conditions and can so till his soil that it will not be washed away in a wet season or the crop burned up in a dry one.

J. F. Voorhees, Local Forecaster.

SILOS AND SILAGE.

According to the researches of Prof. McBride, silos reach back to Persian and Roman times. Varrow speaks of pits in the ground made tight to exclude air and insects and mentions their use in Thrace, Carthage, Spain and Rome. These pits were dug as deep as 12 feet and lined with brick, stone or wood. As now, the ensiled or pitted material was heavily trodden and well packed around the edge of the pit. G. M. Goffard of France first adapted the preservation of green crops to common modern use by storage above ground in stone structures known as silos. Mr. Morris of Maryland read of Mr. Goffard's work and in 1876 he built the first silo in this country. The ensilage congress meeting held in New York City in 1882, was one of the most effective agents in advancing the claim of silage but the most conservative men of the time were afraid of it because of the exaggerated and visionary character of the claims.

In construction silos must be strong and rigid; the outward pressure of the silage when settling at time of filling increases with the depth at the rate of about 11 lbs. per square foot for each foot of depth. Because of this great pressure silo walls must be made very strong when they have a depth of 20 or more feet. The depth should be made as great as practicable, (1) because in this way the largest amount of food per cubic foot may be stored; (2) there is less loss relatively at the surface; (3) the strong lateral pressure forces the ensilage against the walls so closely that less air enters and hence there is less loss.



FILLING THE STAVE SILO.

Several different types of silos have been planned and constructed. The stone silo was among the first in history and is very satisfactory if the inside is made perfectly smooth. As far as the silo itself is concerned no better or more durable material can be used and it will be found one of the cheapest of thoroughly constructed forms. If brick can be obtained at from 4 to 6 dollars per thousand a brick silo or a brick lined silo may be erected at a moderate cost. The most common and perhaps the most economical silo is the wood silo which is built in several distinct types. The square silo is going out of use because in the sharp corners there is a tendency toward loss in silage and also they are hard to hold together and prevent from spreading. The round silo is the best form and is built either of staves or studs. The stave silo is used very much because it is cheap in construction but it is satisfactory only when well constructed and in almost all instances the losses are greatest in a stave silo.

The best and perhaps the most economical silo is the round wood silo which may be constructed as follows according to King. A good substantial foundation of masonry, which is necessary for all kinds of wood silos should be built high enough so that the woodwork everywhere will be at least a foot above the ground to prevent decay from dampness. It may be well to have the bottom of the silo 3 or 4 feet below the surface of the ground and the wall should be 1.5 to 2 feet thick. After the silo has been completed the ground forming the bottom should be thoroughly tamped so as to be solid and then covered with 2 to 3 inches of good concrete made 1 to 4 of cement and gravel. The sill should be made of a single 2x4 cut in two lengths with

the ends beveled so that two can be toenailed together and bedded in cement mortar on the wall then covered with tar. The studding need not be larger than a 2x4 unless the diameter is to exceed 30 feet but they should be set as close together as one foot from center to center. For lining either galvanized iron sheeting which is the tightest of all linings or reinforced concrete lining can be used, but perhaps the wood lining, half inch boards with paper between them is the most economical of all. It is extremely important that the paper be of a quality that will not decay and will be both acid and water proof. Great care should be taken to have the layers of boards break joints and their centers and the paper should lap not less than 8 to 12 inches This method may be made all the better by using two layers of paper between three layers of plank. The weather boarding is not absolutely necessary but it can not well be left off for it helps the looks, protects the sills and studs and also prevents the silage from freezing. We may also leave off the roof but this is not practicable. The conical roof is the best to use on a cylindrical silo. The doors may be made of two layers of 6 inch flooring, tongued and grooved, crossing at right angles, nailed or screwed together with a layer of good acid proof paper between. To make the door fit perfectly air tight there should be tacked on the face of the door jam all round a wide strip of thick tar paper or strips of old worn out rubber belting and the door drawn close up against this with four ½ by 4 inch lag bolts provided with washers. The silo will be most convenient if it has three or four doors or openings the number depending on the height of the silo. These openings may be about 2½ by 3 feet. It is best not to paint the inside but the outside wall should be painted.

The space between the weather boarding and the lining should be ventilated by boring a hole in the weather boarding just above the sill and this hole should be covered over with wire to keep the rats out. The Gurler silo is perhaps as economical as the one described above, the chief difference is that the Gurler silo uses much less lumber than the above; one thickness only of sheeting is considered sufficient whereas in the above, 4 or 5 thicknesses are used. The Gurler silo is lathed and plastered with cement. In any case they must be well hooped together to prevent them from bursting. The cost of the Gurler silo is perhaps just a little less that the one described above but very little difference. A silo 16 feet in diameter and 36 feet high costs something near $175.00. This is very much less than the reinforced concrete silo with a diameter of 22 feet and a height of 28 feet and costing $360.00. The stave silos are often made by manufacturing companies and can be shipped most anywhere all ready to be set up. They range in price as follows and are governed by size. A 30 ton silo costing $109.00 and a 119 ton costing $274.00. In any silo the cost does not increase in proportion to the size. The Minneapolis silo, which is a patent silo manufactured by the Puffer Hubbard Mnfg. Co. of Minneapolis, Minn., is an excellent one but too expensive to be economical.

They range in price from $202.00 for a 37 ton silo to $695.00 for a 250 ton silo.

The dimensions of a silo should be determined by the number of animals to be fed and by the length of time it is desired to feed silage. The number of animals should determine the diameter of the silo and the length of time silage is wanted should determine its height. If a silo is made too large in diameter and this is the most frequent error one of two things will happen. First, the silage will be moldy all the time owing to inability to feed it down rapidly enough or, secondly, the cows will be fed more than they should have in an attempt to keep ahead of the moulding. A cow will ordinarily be fed somewhere between 20 and 50 pounds daily and it frequently happens that it is desirous to cut down the silage ration a third or even a half and still be able to feed down at the rate of 1½ feet daily. In dairy sections many farmers consider this point so important that they are building two small silos instead of one large one.

Where the cows are getting 40 lbs. of silage daily each cow should be allowed 4 to 5 square feet of surface in the silo. Ten cows would require a feeding surface of 50 square feet which is obtained in a silo 8 feet in diameter. Twenty cows should have a silo 12 feet in diameter. If the silage is fed down at the rate of two inches daily or 5 feet per month and it is desired to have six months feed then 30 feet of silage is necessary but after filling the silo the silage will settle 4 to 6 feet so that to obtain 30 feet of silage the silo must be 35 or 36 feet deep. The silage settles much better and keeps much better in a silo 30 feet deep than in a shallower one. The amount of silage a silo will contain increases rapidly with the depth as shown by the following figures. A silo 16 feet in diameter and 20 feet deep holds 67 tons of silage; the same silo 30 feet deep holds 119 tons; a silo 40 feet deep holds nearly three times as much as one 20 feet deep.

Assuming that each cow eats 40 lbs. of silage daily, which is a very conservative estimate for a dairy cow, then one cow will consume 3.5 tons of silage in six months. 30 cows would require a silo with a capacity of 108 tons which could be put in a silo 16 feet in diameter and 30 feet deep. Very few silos are constructed with a capacity less than 36 tons or enough to feed 10 cows for 6 months. Since a small silo costs more in proportion than a large one it is not very economical to build a silo with a capacity less than 36 tons. Judging by these figures it would require a herd of ten cows to make a silo pay.

There are a large number of kinds or makes of ensilage cutters, Gordon Hummer, Tornado, and Blizzard being among the best. Most farmers use the size of cutter that is adapted to the engine which they perhaps already own but they should also consider that it is most economical to use a machine that will handle the crop during the period of proper degree of ripeness, which lasts only for a week or ten days. A cutter with a blower is

very much more economical than one with a carrier if the engine is large enough to pull it. It requires about a 10 or 12 horse power engine to run an ordinary sized cutter with a blower. For the small farmer the small sized cutter without the blower has become very much in favor because they can be run by a four to six horse power gasoline engine which in themselves are simple to operate and do not cost so much as the large engines to buy or operate. The cost of cutters vary with size from $75 to $150.

The ensiling of cattle food is based on the following principle. The forage products are preserved by packing them in bulk in such a way that the subsequent heating shall expel the air and check the process of decay so that the forage will remain green, succulent and wholesome and be practically unchanged after the first fermentation has run its course. The success of the process depends partly on the fact that the heat of the initial fermentation is so great that many of the germs of decay are killed and partly to the oxygen which is entangled in the mass being replaced by carbonic acid gas that is formed and that acts as a bar to further changes.

Results given in Experiment Station Record 13, where the experiment was carried on with sealed jars and the material used was peas, cow peas, oats, rye, and corn. The greatest loss in weight occurred during the first 18 days, oats being greatest, rye second and corn last in amount of loss. According to these figures a hundred tons of corn would lose 1.27 to 1.62 tons. Corn harvested in the milk stage lost 3.31% of green weight in 105 days and corn in mature stage lost 3.24% of green weight in 59 days. Corn harvested in the milk stage lost 20.10 cubic feet of gas and corn in the mature stage lost 17.05 cubic feet of gas and about 70% of this gas was carbonic acid gas. Losses as follows are shown in Experiment Station Record 12.

	Top Layer,	Mid. Layer	Bot. Layer.
Cedar silo with doors lost	59.75%	13.15%	31.75%
Pine silo without doors lost	49.71%	14.98%	26.16%
Iron silo water tight lost	9.21%	7.01%	.51%

This indicates very clearly the necessity of a tight and well constructed silo. About 1% of the total loss of silage is due to the carbonic acid gas evolved and to a respiratory activity. The loss of corn fodder by curing according to the Wisconsin and Vermont Stations show a loss of 19 to 21% of the dry matter which is very much more than the losses from silage. The loss in nearly ripe corn was about 5% more than in corn cut in the roasting ear stage which is almost the stage that silage is cut. This loss is evidently due to the large amounts of carbohydrates.

The most common materials used for silage are corn, sorghum, clover, alfalfa and soy beans and their compositions are as follows:

	Digestible nutrients per 100 lbs.			
	dry matter	protein	c. h. & o.	other ex't
Corn	20.09	0.9	11.3	0.7
Sorghum	23.9	0.6	14.9	0.2
Clover	28.0	2.0	13.5	1.0
Alfalfa	27.5	3.0	8.5	1.9
Soy beans	25.8	2.7	8.7	0.7

Corn is considered preeminently the best of all silage crops. It has a wider range and produces more silage than any thing else. Sorghum is not as good as corn; not relished, not so nutritious. In Kansas, where corn is not grown very extensively, Kaffir corn is used and is very satisfactory as a silage crop.

Clover has been used more extensively in the past than at present; much clover has been lost due probably to the fermentation process which it goes through It should be well matured and free of dew when cut and may be put in the silo either whole or cut. Alfalfa is not considered an extra good silage crop. Soy Beans and Cow Peas produce large amounts of very nutritious food but it is not entirely satisfactory in the silo unless layers of soy beans, or cow peas and corn are alternated.

For silage in Tennessee corn is grown because it is best suited to our conditions and when its solid succulent stems are cut short it keeps very well. As a rule it is the most economical succulent food that can be obtained for dairy cows at a season when pasture is not available, although not a balanced ration in itself it tends to heavy milk production. A stockman in the north can produce a large amount of roughage from a given area by use of a southern variety but it is really best to use a rich, smaller variety that will mature in his locality. The dent type is considered the best for silage purposes and the following varieties are recommended: Albermarle Prolific, Cocke's Prolific, Leaming, and Yellow Dent. For Tennessee conditions Cocke's Prolific has given best results.

When corn is grown for silage it should be planted in rows 2½ to 3 feet apart and drilled in with 6 or 8 inch spaces between each stalk. This requires 14 to 20 quarts of seed per acre depending on the size of the seed. The best time to harvest is when the kernels are rather hard, dented or glazed and the lower leaves still green. This period only lasts about a week or ten days. On the whole it pays to wait for maturity and take frost risks for slightly frosted silage is eaten all right by cows but there is some danger of a decrease in milk.

The experiments at the Wisconsin and Vermont stations are not in favor of pulling off the ears and running the stalk through a silage cutter into the silo. One acre of silage with ears is equal to 1.26 acres of stalk silage plus the meal of the ears that were taken off. Ten tons per acre is a very conservative estimate to count on here in Tennessee and the average cost of production per acre is $5.40 or 54 cents per ton. Estimates on cost of put-

ting green fodder in silo run about as follows at different stations. New Hampshire $1.08 per ton, Massachusetts $1.50 per ton, Kansas $.71 per ton and Maryland $1.43 per ton.

Silage stands prominent as a dairy feed and without it the dairy business would be in a deep hole, in fact silage gets its importance as a dairy feed. At the Vermont station a larger yield of milk was gotten from silage fed cows and considering the yield of milk and butter fat from corn and silage grown on equal acres of land, the result was in favor of silage at the rate of 8% more milk and 5% more solids and 3% more fat. In an experiment in which silage was fed to beef cattle for a period of 42 days, 4 steers were given silage and grain and 4 others clover hay and grain; the silage fed steers gained 1.75 lbs. per day and the hay fed steers gained 1.40 lbs. per day. Beef cattle cannot be fed such large quantities daily as dairy cows As a sheep feed silage is becoming more and more in favor; in an experiment where one lot of sheep were fed roots and another fed silage, the gains were the same but the profit on those fed roots was 22 cents per head and 65 cents per head on those fed silage. In almost all attempts silage has proven unsatisfactory as a swine feed and for horses it has been condemned as injurious but it is thought that perhaps too large quantities were fed.

For dairy cattle as much as 40 and 50 lbs. of silage is fed daily but for beef cattle only about 20 to 30 lbs. are fed. It is easily digested and keeps the digestive system in a healthy state of activity. Fodder fed all winter tends to produce a dry firm flesh, a condition not conducive to the highest degree of health. In a few experiments where soy bean and cow pea silage was fed it showed a bad effect on the milk, butter and cheese.

—Arnall Peery, '10.

AGRICULTURE IN THE PUBLIC SCHOOL.

A General Exercise for the Whole School.

An extract taken from a recent communication:

"Do I teach agriculture? I may answer both yes and no.; as a special subject, no. My principal is as fond of the work as I, and has held that class as his own. But even in my classes from the fifth and sixth grades I find that nothing makes a prettier supplementary study than extracts from agriculture. The study of the life of insects harmful and helpful proves most interesting but no part I have yet introduced has been dull. Last week we had ears of corn judged (on a small scale) and tested, and the children even told me that their fathers were using the test at home to see if they could make it "grow between blotters."

This week we are testing the requisites of germination, and at the earnest request of the children I am leaving a cotton garden of wheat (on water) there for further study of the parts for the plant. We have a little of all parts of the work in the real class of agriculture thru these little children.

EDITORIAL.

The following extracts were taken from an editorial in a recent issue of the Nashville American:

Last Monday there was inaugurated at Winchester something new in the educational policy of Tennessee. The State University at Knoxville began there a short course in agriculture, a practical school for farmers. The university for years has offered such courses within its halls, but now it proposes to send its instructors to the people instead of asking busy men to abandon their work for a season to devote themselves to study.

This short course in agriculture is a form of university extension that will commend itself to the public. We have been familiar with university extension for several years as meaning a few popular lectures on scholastic subjects delivered by professors in localities remote from their institution. This looks like an effort to carry the university into the every-day life of the people. It opens vistas of usefulness heretofore unsuspected for these higher institutions of learning, and it is bound to create in the public mind a sympathetic interest in the head of the public school system. Just now very few people in Tennessee realize that the State University is as much theirs as the school in their neighborhood. It is supported by the State, and its efficiency is largely determined by the liberality of that support. This new departure in university instruction will do more to popularize the institution among the people than all efforts heretofore made. It makes the university, in a very real sense, the people's college. It overthrows a fallacy that has long obtained in the public mind, namely, that the State University is designed to serve only the favored few. In point of fact, the University must serve every class in the State. It must interest itself in the betterment of every interest affecting the welfare of the people before it attains its greatest usefulness.

It seems that in this new departure there is to be opened up a long sought for way of bringing the University closer to the great mass of the people of the State. There has existed, ever since the first advocacy of applying scientific principles to farming a prejudice against the idea, due purely to a misconception of it and as a result the Agricultural Experiment Stations and all other advocates of improved methods have been looked upon with a great deal of suspicion and believed by a large class to be entirely impractical. This fact, among others, has made it impossible to induce a representative number to avail themselves of the unusual advantages offered by the Short Course in Agriculture. It is undoubtedly true that all those who have attended these courses at the University have been favor-

ably impressed with the work done and if they had wrong impressions of the institution they certainly had them righted, but the number of students has not increased appreciably despite all the efforts that have been put forth in their interests. The farmer must be approached along lines which appeal directly to his personal interests and the above plan seems to have been the most successful attempt yet made.

There may be a question of doubt raised as to whether this great effort on the part of the members of the agricultural faculty will result in sufficient good to the University to compensate for the sacrifices they are making of their classroom and other duties while away lecturing in these courses, but if we may hope that these efforts will result in making this class of people realize the importance of the University to them there can be no question as to their value. This prejudice against higher education which has so long held us back as a State and which is especially prevalent in the more remote districts must be overcome before any great advance may be expected and it appears from the interest shown in this course at Winchester that here is a field which may be developed to great advantage. It is true that at present there is no one at the University who has time for this work but it is to be hoped that the outcome of these efforts will be the establishment of a department for this agricultural extension work or at least may lead to the employment of a corps of instructors who shall have this in charge. The need is self evident and if the right steps are taken the University will profit largely by it.

Taking the Short Course to the farmer is not to end with the week spent at Winchester but through the hearty co-operation of Hon. John Thompson, Commissioner of Agriculture, it has been made possible to conduct courses of one week each throughout the month of December at Jackson, Cookeville and Dickson. Much interest is already in evidence at those places.

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Getting Ready for High Prices.

THE U. T. FARMER

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THE ROTATION OF CROPS.

Definition of Rotation.

The term "rotation of crops" is used to designate a system of recurring succession of plants covering a regular period of years and maintained on alternating fields of the farm. Its purpose is primarily to increase the productiveness of the soil by conserving fertility and eliminating weeds, pests and crop diseases. Definite rotation is usually a practice of old and well established countries where the virgin fertility of the soil has been somewhat depleted and new lands are not to be had. When this "rotation of crops" was practiced systematically and strenuously according to well established rules and customs as was done formerly in many parts of Europe, the idea was to divide the farm into as many parts or divisions as there were kinds of crops to be grown and to raise a different crop on each division every year.

History.

Insofar as this country and Northern Europe are concerned the practice of rotating crops seems to be a relic of the time of village communities. It is true that several noted writers of antiquity held views in regard to rotation which are in accordance with principles now known to be correct. Xenophon speaks of a two year rotation of wheat and fallow and Cato and Varro and Virgil tell of the alternate culture of grain and legumes and there are good reasons for believing that these practices were kept up through the middle ages in Italy and other parts of Southern Europe and that they may have persisted even to the present day in some localities. In the days when the village, and not the individual, had the management of private affairs, it was customary, instead of having the plough-land partitioned off into separate farms, to let the fields lie open and unenclosed and to have these fields cultivated by many individuals, each one working for himself upon separate strips of the common tract; *i. e.*, on pieces of land which were allotted to him for a single season. To avoid all conflict each of the large common fields was marked off into three great parts, one of which parts was devoted one year in three to grain, another part to summer grain (barley or oats sown in the Spring) while the third was left fallow. This was the old three course system of rotation which through many centuries was practiced almost universally in the more fertile parts of Europe and so long as the system of common unenclosed fields prevailed it was impossible for any one person to de-

viate from the established practice. In a majority of instances tradition has probably had more to do with the maintenance of rotations than any scientific conceptions of them.

Reasons for Crop Rotation.

A great many reasons may be given for the practice of rotation, a few of which follow:

1. One crop tends to correct the faults of another crop. The continuous growing of any one crop usually results in the injuring of the soil in some respect. A rotation tends to overcome and eliminate such effects:

2. Plants differ considerably in the proportions and kinds of food they take from the soil. In rotations the different plants make the maximum of their draft upon the soil at different times of the year, thereby allowing the progress of the season to even up the inequalities.

3. By a judicious choice of crops different plant food materials may be incorporated in the soil in available condition through the decay of the parts plowed under or left in the ground. The most marked benefit of this kind comes from the storing up of nitrogen compounds through the use of leguminuous plants.

4. Some plants have the power more than others to utilize the content of the subsoil. Such plants may not only make less draft upon the surface soil but also add to the richness of the soil by their more extensive root systems.

5. A rotation may be so planned as to maintain the supply of humus in the soil. Humus coming from the decay of organic matter not only adds to the supply of plant food in the soil but also improves the physical texture of the land.

6. Experiments at the Ohio Station show that well planned rotations reduce the necessity of excessive use of commercial fertilizers.

7. A good rotation provides for the making of farm manures by encouraging the practice of live stock farming.

8. Rotation is a cleaning process. Most weeds and insect pests may be eradicated most effectively by the use of the proper rotation.

9. Rotation farming maintains the continuity of farm labor and reduces the difficulties of trying to get a large supply of help for one season and then disposing of it when the rush is over.

Experimental Results.

A comparison of the results obtained at Rathomsted in growing wheat on three plots continuously unmanured since 1852 follows: On the first plot has been grown continuously, on the second wheat has been alternated with a year's bare fallow and on the third wheat has been grown in a four course rotation.

Continuous Wheat	Wheat after Fallow	Rotation Wheat
Bushels	Bushels	Bushels
12.4	18.1	28.6

In the twelve years during which comparison is possible the average

crop of wheat grown in rotation has been 28.6 bushels per acre as against 18.1 bushels for wheat after fallow and 12.4 bushels for continuous wheat.

At the Louisiana Experiment Station a rotation of first year corn, second year oats, followed by cowpeas, and third year cotton gave an increase in yield of 15 to 25%, without any manure and where manure was applied the increase in yield ranged from 400 to 500%. At the Indiana Station a rotation of timothy and clover, beans and roots gave during seven years a yield of 20% more grain than a rotation of maize oats and wheat. The gain of corn for the last year was equal to 48%. According to the Minnesota Station land loses heavily in nitrogen when cropped continuously in wheat, corn, potatoes or mangels but when a rotation such as wheat one year, clover and timothy two years, oats one year and corn one year, with manure applied to the land, was practiced, the soil gained very perceptibly in the percent of nitrogen.

The Georgia Station found that the practice of growing cover crops in winter on land which was continuously cropped in cotton gave an increase in yield of cotton from ⅓ to 2 bales per acre.

Systems of rotation, like most other things in this world, have their origin in, and are maintained by the circumstances which surround them. Every one of the existing systems has been developed by force of local circumstances, and there must consequently not be attached too much importance to the theory of any one system, or to undervalue the merit of another. Climate, distance from market, the cost of labor, the ease or difficulty with which manure or forage may be procured, the general character of the soil of the district, as well as the amount of capital under the control of the inhabitants, are circumstances any one of which may determine the character of the rotation practiced.

—R. M. Murphy, '10.

COMMERCIAL FEED STUFFS.

It is with a view of presenting to the purchasing public a more intelligent interpretation of the law as applied to feed stuff and to convey a clearer understanding of the analysis of the various feeds as shown on the tags that are now required to be placed on every brand that is sold in the state that this article is undertaken.

Not in all of the States, by any means, is the law so framed as to require in the guarantee of a mixed or compound feed the crude fiber and the carbohydrates as well as the protein and fat. In fact, the law of Tennessee, by Act of April 29th, 1909, requires what might be technically termed a complete analysis.

I have been asked more than once by users of feeds what carbohydrates indicated on the tags and just what the advantage to a feed could be in having a low or a high percentage of this ingredient.

To begin with, the important factor in any feed is its digestibility. Numerous experiments along this line have been conducted upon different animals, not upon any one specific feed that is now sold on the Tennessee market but upon the various types of feed. The reader is respectfully referred to the tabulated results as given in Henry's Feed and Feeding.

To quote from the Tennessee Feed Inspection law, Chapter 434, House Bill No. 495, Sec. 7: Be it further enacted, That who shall mix or adulterate any concentrated commercial feeding stuff with foreign, mineral or other substance or substances, such as rice chaff or hulls, peanut shells, ground or crushed corn cobs, oat hulls or similar material of little or no feeding value, or with substances injurious to the health of domestic animals, or who shall sell, offer or expose for sale any concentrated commercial feeding stuffs so mixed or adulterated shall be guilty of a violation of this Act.

In this connection is suggested as a means of easily detecting such adulterants as mentioned above, a close examination of the sample with a hand magnifying glass which in almost all cases will be sufficient to establish the character of the adulterant at least. A more accurate means of course would be a microscopic study of the sample. It is very possible to compound a feed so that measured by the chemical analysis alone it would appear of of a very good standard yet contain a large portion of highly indigestible material. It is safe to say, however, that when by analysis such a feed is found to contain less than 9 percent of crude protein and more than 10 per cent of crude fiber it becomes an object of suspicion. Even when a compounded feed carries as much as say 18 per cent of protein a high percentage of crude fiber is an indication of inferiority because of the introduction of some highly fibrous material.

From the chemists' standpoint the composition of the various feed stuffs on the market to-day consists in the following analyses:

Water, which consists simply in drying the sample for a given time at a certain temperature and estimating the loss as the moisture of that particular sample.

Ash—The sample is next burned to drive off or consume the volatile organic matter, the remainder being the silica and other mineral constituents of the feed.

Protein—The process of determining the protein is too intricate to go into here, but it is enough to say that it is made as nitrogen and this result multiplied by 6.25 gives the percentage of protein.

Crude Fiber—The crude fiber is determined by boiling the sample with successive portions of weak acid and alkali solutions, which dissolves all the softer parts, leaving that portion of the plant or feed which constitutes the frame work. It consists for the most part of cellulose.

Ether Extract or Fat—This constitutes that portion of the feed that is capable of being extracted or taken out by means of an extraction with ether and is commonly called fat.

Nitrogen Free Extract—That portion of the organic matter of the plant or feed which is left after deducting the preceding group of compounds is strictly speaking the nitrogen free extract. It contains starch, sugar, pentosans, gums, organic acid, etc. In the correct statement of the analysis of a feed the crude fiber and the nitrogen free extract together constitute the carbohydrates. However, it is generally taken that the dry matter in the sample minus the ash, ether extract or fat, crude fiber and protein equals the nitrogen free extract percent.

In looking at a feed from the standpoint of the digestibility of its various ingredients, it might be said that the higher the ratio of protein to the non-nitrogenous constituents in a feed the greater the percentage of protein digested. Also that a high percentage of protein proportionately, aids the digestion of cellulose of the fiber.

The digestibility of the ether extract or fat varies greatly in the different feeding stuffs, ranging from 30 percent to over 90 percent in cereals. In taking into consideration the relative value of fat and carbohydrates in a feed, in the formation of flesh in the animal body it has been shown that carbohydrates and fat were practically of equal value, pound for pound, as aids in flesh formation and that the relative fuel value of these two divisions of food substance is not a measure of their comparative nutrition effects.

W. K. Hunter, Asst. Chemist, Agricultural Experiment Station.

PRODUCTION OF SWEET POTATO PLANTS.

In the production of sweet potato plants, several essential points are to be taken into consideration, the selection and storage of the seed whether the production is for home or market use, the time for bedding, preparation of the beds, bedding out of the seed and care of the bed.

Usually, just before or after the first frost, the crop is dug, and the undersized and medium potatoes are set aside for seed. These are taken into a storage house, either a cellar, pit or a potato house, and are placed so they will not have to be handled but the one time, as every handling causes more or less loss from decay. A temperature of 55 to 65 degrees with considerable ventilation is usually maintained throughout the winter. The piles are kept free from moisture by preventing the admittance of the outside atmosphere during damp weather. The following spring, about bedding time, the potatoes are sorted over, and those that are uniform in size and shape, showing no signs of bruises, cuts, decay, or disease, about large enough to pass through a 2-inch ring or the opening formed by the forefinger and thumb of the hand, are selected for bedding.

If the planter desires a warm or hot-bed, from March 20 to April 5 is a very favorable time for the preparation, but if he is to prepare a bed of soil alone, from April 1 to 15 is a favorable time. It must be remembered

however, that the soil will have to be warm in order to cause the seed to sprout.

The grower will first decide whether he is to produce plants for home use alone or for market use also, and build his bed or beds accordingly. In putting out a manure heated bed, an excavation 12 to 14 inches deep and as long and wide as desired, is made, 8 to 10 inches of fresh horse manure are first tramped into the bottom of this pit, then a 2 to 3 inch layer of fine sifted sand is spread evenly over the manure. Whatever covering is used is then placed over the bed and allowed to remain for a day, or long enough for the manure to heat the layer of sand to a temperature of 80 or 85 degrees. The seed-potatoes are then arranged upon this bed by hand, leaving just enough space between to keep them from touching each other, and if large potatoes are used, they may be split open lengthwise, placing the split surface down. When the seed are in place cover the whole bed with 3 to 3½ inches of fine sand. The bed is then watered, covered and kept as near a temperature of 50 to 55 degrees as possible. It is well to remember that no great amount of water is to be allowed to seep into the manure as this is sometimes the cause of decay and the loss of a great amount of seed. After such a bed has been properly cared for, for five or six weeks, the plants are ready for drawing.

Where a bed made of soil alone is to be used, a pit 10 to 12 inches deep and the size desired is made, 6 to 8 inches of leaf mold or very rich soil is tramped into the bottom of the excavation. A 2 inch layer of fine sand is spread evenly over the mold, and the seed potatoes are then put into place, leaving small spaces between them. An inch layer of loam is spread over this seed in order that they will be more firmly settled at the time the plants are "*drawn*" and finally a 3 inch layer of sand is evenly added. The potatoes are planted at a good depth in order that they may produce plants with good vigorous stems and roots. The bed is looked after regularly and protected from too much rain and cold. By this method, plants may be grown but not so fast as in the manured bed.

As a general rule sweet potatoes are transplanted in the gardens and fields directly after a rain. In order to avoid delay in planting, the plants are *drawn* and placed in piles or baskets ready to be transplanted to the fields. At the time of drawing, the plants on the bed are of all sizes, and only those with good stems and roots are drawn; the smaller ones are left for later use. In drawing plants, the thumb and forefinger of one hand are used to hold the seed potato in the bed while the plant is pulled off with the other hand. Where several plants are pulled up in a bunch, they should be separated in order to avoid the loss of time in dropping them. Plants having three inch underground stems covered with strong vigorous roots are most desired as they are more likely to withstand the transplanting. After each removal of plants, the bed is sprinkled with liquid manure to hasten the growth of the younger ones.

In preparing sweet potato plants for transportation to the field or for

shipment, they are drawn and tied with soft strings in bundles of 100 each. The plants will not stand a great amount of moisture, and are packed while the tops are dry. A little damp paper or an old sack may be placed in the bottom of the basket, and the roots dipped into a mixture of manure, soil and water, and then placed in the basket where they will remain in good condition for a week or more.

Where potato plants are wanted, with proper care, they may be produced by any one who will first select good seed, prepare a bed properly at the right season, and wait until the plants have vigorous stems and roots, before drawing them.

—Judd Brooks, '12.

THE TOBACCO HORN WORM (Phlegethontius.)

Each year many thousand dollars' worth of tobacco is destroyed by the horn worm which is very prevalent throughout the tobacco growing district. Considerable data has been collected with regard to the life history and habits of this worm, which is in part given below with the hope that it may be of value in combating the pest. The adult form of this worm is a large brown moth which passes the winter in the pupa stage in the ground. In the Spring these moths emerge from the pupa cases and deposit eggs upon the tobacco plant, upon Jamestown and upon several other solonaceous plants occasionally. Each moth deposits about 300 eggs, about 80 per cent of which are placed on the underside of the leaves. These eggs are deposited during the evening and at night, the moths remaining in hiding during the day. In from three to five days these eggs hatch into larvae 3.5 to 4 mm. long, which soon begin to feed upon the foliage of the plant. These larvae increase in size rapidly and pass through 5 instars before pupating, which occurs at from 16 to 24 days from date of hatching The second generation of moths emerge from June 1st to the latter part of August from 45 to 55 days from date of hatching.

The larvae do not do much damage before they reach the third instar but then if in large quantities they begin to injure the plants noticeably. The greatest damage, however, is done by the fourth and fifth instar larvae, four of the fifth-instar ones being able to destroy a full grown tobacco plant if left unmolested until they pupate. When the larva gets ready to pupate it crawls off the plant and bores its way into the moist ground from 3 to 10 inches. The larvae do most of their feeding at night and during the cooler parts of the day, seeking the shade at mid-day.

As a means of combating these worms arsenical poisons have been used very effectively. Paris green when applied at the rate of 1 lb. to 100 gallons of water killed 70.2 per cent of all the larvae exposed to it. When applied to young plants at topping stage 100 per cent were killed. A solution of 1 lb. to 150 gallons of water is sufficiently strong to kill all

first and second instar larvae but for fourth and fifth instar ones 1 lb. to 50 gallons of water is necessary. One pound of arsenate of lead to 25 gallons of water has been found effective with first and second instar larvae and for other larvae 1 lb. to 6 gallons; however, it has been found difficult to make an application sufficiently heavy to kill fifth instar larvae. Experiments show that a large percent of the pupae may be destroyed by deep fall plowing, hence this practice would seem to be of great practical value. A few species of Tachinidos are parasitic upon the larvae and apantiles destroy a few of them. Thirty percent of one collection was found to be parasitized.

D. C. Parman, '11.

ANNOUNCEMENT.

There will be a meeting of the officers and delegates of the East Tennessee Farmer's Convention during the month of February at the University and the secretary, Prof. H. A. Morgan, is desirous of having the different vice presidents send in subjects for discussion at this meeting, which will be of most interest and benefit to their particular sections of the State. As we have not had any communications from some of the officers during the year it is thought best to publish a complete list of them at this time to remind them that we would be glad to publish any announcement or news of interest from them.

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EDITORIALS.

The Short Course in Agriculture is now in progress at the University. It opened the first of the present month and has started out with the largest class in its history and with a class of students who know what they have come to the University for and are busily engaged at present in trying to gain their purpose. There are at present 41 students enrolled in the course in Soils and Crops which ends January 15. The course in Live Stock follows and the number of students will doubtless be increased considerably by men who are especially interested in live stock. After the two weeks' course on live stock will follow the course in Dairying and Horticulture, which during previous years have attracted more special students than either of the former courses. The interest in education is more manifest throughout the State to-day than ever before and more general, as shown by the distribution of students of this course who have come from all parts of the State.

* * * * * * * *

Thursday evening, from 7 to 10, the Agricultural Club gave its annual "Shorthorn" reception in honor of the students in the Short Course. The evening was spent very pleasantly in getting acquainted with the members of the class and trying to make them feel perfectly at home in the University. Prof. Schmitt, Dean of the University, was present and spoke on the relation of the University to the State. Light refreshments were served.

* * * * * * * *

The personnel of Experiment Stations has been a fruitful theme of discussion. It has become a matter of increasing importance as the stations have developed and more of their work has assumed the character of investigation. For several years it has been in large measure the keynote of advancement. * * * The total number of employes on the scientific staff of the stations in the United States, as shown by the new organization lists is 1234. This number is exclusive of treasurers, accountants, registrars stenographers, clerks, janitors and laborers and includes only the actual workers and their assistants. About one in seven of the station men changed during the year and the appointments averaged more than four for each station.

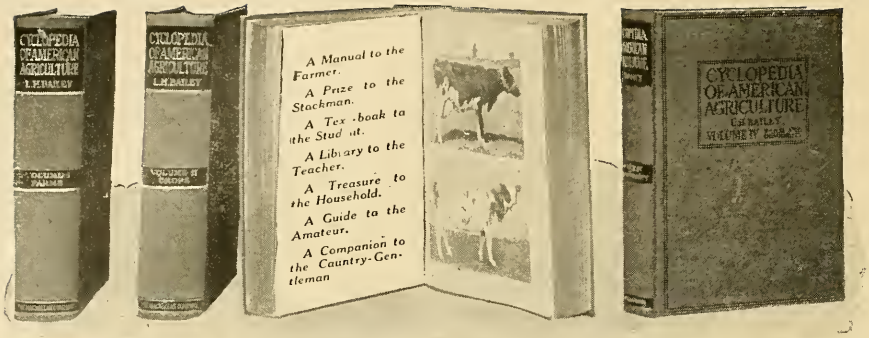
Five years ago the total number of station workers was 765. The present list, therefore, shows an increase which has made heavy demands on the colleges. Considering the number who dropped out from the Station ranks it is evident that on an average considerably more than a hundred new persons have been appointed each year for the past five years. In

addition to this the growth has been equally as large or larger in the teaching staff of the agricultural colleges, and new extension departments, and other agencies calling for trained men have developed rapidly. This department alone has taken large numbers of men of different grades in that period. It is probably no exaggeration to say that fully five hundred new men and women are now required annually to fill technical positions in institutions of this kind; and with the spread of agricultural teaching in secondary and normal schools there is no likelihood of an immediate decrease. This is a demand worth catering to. * * * Of the total number of persons at present on the scientific staff of the stations four hundred and fifty-seven hold advanced degrees awarded for graduate study. Among this number nearly three hundred have the master's degree, forty-five have degrees in veterinary science and medicine and one hundred and twenty have the doctor of philosophy. * * * Advanced degrees when earned represent opportunity. They do not necessarily indicate productive ability and the possession of them should be only one of the qualifications considered in candidates for station positions. They merely signify that the men bearing them have had the advantage of special advanced training of a kind which should teach them the meaning and spirit of science, and something of its methods. The institution where the degree was taken is to some extent a gauge of the opportunity the man has enjoyed. But advanced study is of such importance and value as a preparation for station work that the mere possession of evidence of it is a decided point of advantage.

Little real preparation for a scientific career in any line can be obtained in the regular undergraduate courses of any institution. These courses merely give the man the groundwork and prepare him for what is to come. If he elects experiment station work as his career, graduate study is quite as essential as if he elected medicine or law or mathematics. This gives him his point of view, his broader and more critical outlook, his attitude and his ideals. It is not merely informational, but its greatest influence is on the man himself, for it prepares him to weigh and profit by his own experience and that of others in further perfecting himself. Nothing can take the place of it but long experience and self-education and even this is only partially effective with the average man. The handicap with which he starts out is likely to stay by him and to prevent his rising above a certain level. * * *

The point of view and general grasp which the agricultural graduate has is of material advantage and if he will supplement his college course with advanced study will make him a strong man. But this point of view and familiarity with the subject are not everything or the special training which gives the prospective worker, not merely added information, but the proper attitude toward investigation and teaches him the value and significance of a scientific fact.

Exp. Sta. Record, Vol. XXI, No. 7.



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THE IMPROVEMENT OF CROPS BY SEED SELECTION

Every farmer has it in his power to improve his crops from year to year by a careful selection of seed. The change will in most cases be gradual, and one may hardly realize any improvement from one year to the next, but if he will save samples, and compare the first, fifth and tenth successive crops, he cannot fail to note an improvement that will more than repay the effort put forth.

Of course, any improvement by selection cannot be hoped for unless the fertility of the soil is maintained, and equally, of course, one must make due allowance for variation in season; with these factors well in hand the opportunity for crop improvement by seed selection can be measured by the care and intelligence of the man who from year to year selects the seed.

The Tennessee corn grower will find in Professor P. G. Holden's work (published by the author, Ames, Iowa), practical directions that can be followed by any farmer on his own farm, without special equipment, which will increase his yield to a surprising degree. During the recent short course at Dickson Mr. Miller gave his experience with the Holden method, and proved its adaptability to any farm.

But we want in this article to discuss a principle that may be applied to any crop. Darwin held that nature, unaided, practices continually an elimination of weak and a selection of strong individuals, and from this practice has come the survival of the fittest. Guided by human intelligence the slow processes of the wild are vastly hastened, and not only may the most fit survive, but from these may come a much more rapid improvement than can be attained by nature unaided.

Everywhere two seemingly opposing laws find place—the law of similarity, "like begets like," and the law of variation, which is quite as important, and on which Prof. Bailey has made his epigram, "unlike begets unlike." The farmer who would improve his crop must keep constantly in mind both these laws, and recognize their full force. In the larger view like begets like—one need not expect figs to spring from thistles, nor wheat from corn. But within each kind of plant there is sufficient variation to admit of choice. This is quite as true in the case of potatoes, in which the plant comes from a bud, as of peas in which the plant comes from a seed.

A student of the College of Agriculture grew two crops of Triumph

potatoes a year for three years, starting with a commercial sample. He numbered each plant of the first planting, and thereafter selected for seed the best of each generation of his first crop, keeping thus a pedigreed record for six generations. The reader can hardly imagine the variation that developed in this brief experiment. There were differences in earliness, in vigor, in size of tubers, in number of tubers—the grower had abundant opportunity for making selections on all these important points. And his total crop of the sixth generation was a marked improvement on a crop grown under the same conditions from ordinary commercial seed. The practice of selling the best potatoes from crop to crop and using the culls for seed, can never result in improvement—it must bring about a deterioration.

Every orchardist knows that all his trees of any given variety are not equally fruitful, and Mr. Geo. Powell of the Pomological Division of the United States Department of Agriculture, has made most interesting observations on this point, proving conclusively that it is entirely practical to increase the fruitfulness of apples by propagating only from the best bearing trees of the desired varieties in an established orchard.

If bud variation offers opportunities of improvement by selection it is safe to assume that there is even greater variation, with larger opportunity of improvement, with the seed as the basis of operations.

Among plants, as among animals, the range of variation is not equally great among all species—some kinds of plants vary more than others; and of course the greater this tendency the more room for improvement by choosing always the best for planting. Even with the most careful commercial grading there is considerable difference in size in every seed sample. Vegetable seeds, as ordinarily bought in packets, illustrate this to a remarkable degree. I separated a sample of Yorkshire Hero garden peas, planting the largest, the medium, and the smallest separately, and I got best results from the largest seed.

Examine the fruit of peas, and you will find a range of from 3 to 11 peas in the pods. I feel pretty sure it would pay to plant from the many-seeded pods rather than from the few-seeded. And am even surer that the plant bearing pods all having many seeds would be much preferable as a seed plant to one with many few-seeded pods.

Everywhere this principle of selection has place. The farmer has in it a study of the greatest interest as well as profit. It may seem absurd, at first thought, to scrutinize carefully the clumps of orchard grass in order to find which among them has the longest and the most leaves, with a view to saving the seed of that clump, and thus, through a series of years, increasing the herbage; but it gives the student a very intimate acquaintance with his grasses, and, put into practice, it will improve his pasturage. For the pasture, no less than the corn field, is made up of a multitude of individuals, among which there is a wide range of variation. When the man of sufficient discernment and patience brings his powers of observation to bear on

those individuals of the meadow, the field, the garden, and the orchard, the world will hail him as a wizard. Every farmer may improve his crops by selection.

—By Charles A. Keffer in The Southern Agriculturist.

EDUCATION FOR EFFICIENCY.

This is the term employed by Dean Davenport of the college of Agriculture of the University of Illinois to describe the complex processes of education. It places the emphasis somewhat differently from Herbert Spencer's definition which is "preparation for complete living." In its broad sense, education connotes all that the home, the schools, the church, experience and vocation itself can give by way of training for social efficiency. In this article we wish to confine our discussion to a brief statement of three aspects of education.

First. The help which the school affords:

Second. The importance of the time element, and,

Third. The value of present normal activity in the schools.

In speaking of the school as the conventional institution for the education of the race, we are aware of the ideal that is held up for our admiration in the self made man. It would indeed be ungracious to detract anything from the honor due those who possessed talents of such a high order that they achieved distinguished success without the aid of the school. Few of these, however, deliberately chose to dispense with the schools. Circumstances, it may have been poverty, parental discouragement, unfavorable neighborhood ideals, ill health, or in case of the foreign-born, among whom are found a very large percentage of self-made men, particularly in commercial life—several or all of these combined with the language problem, forced them to forego the benefits which the school could bestow.

If it be granted that self-made men have achieved signal success, it is proper to inquire whether even larger success would not naturally have attended their efforts if the help which the school affords had been enjoyed by them. They almost invariably express regret that they were deprived of those advantages; they are most friendly to the schools; the schools are the favored objects of their benefactions. Surely the two largest donors to higher education the world has known are self-made men; this represents their practical argument for the schools.

Unwarranted conclusions are frequently drawn when the life of a self-made man is studied. It furnishes no safe basis for generalization. It only means that he succeeded. Very few men have it in them to conquer success by sheer force of character, will and native parts; to the average individual, the aid of the school is of paramount importance—to all it is helpful. In the future, as in the past, there will be rare individuals, who defy all attempts at classification and overthrow all our favorite theories as to what

constitutes the approved pathway to success. No science concerns itself chiefly with variations from the normal type; an exception is an interesting phenomenon which requires explanation, but it is an exception nevertheless. These men are exceptions to the general law, and that law is that systematic, protracted formal training is the surest promise of success, and this may fail.

General assent will be given to these propositions: First, that the school was never so effective an instrument in qualifying one for practical service as it is to-day. Schools to-day are manned and equipped with material means in a manner scarcely dreamed of a generation ago. Their intelligent ministry to the practical demands of current life has compelled most generous and substantial recognition.

Second, the complexity of modern life has greatly increased within the past few years. A higher type of efficiency is required to cope with present day problems. The hypothesis of the self made man may break down here, though occasionally adequate under a simpler organization of society.

Third, that apart from all theory, the world for purely business reasons does endorse the work of our schools by choosing the product of these schools to do the world's work. It is a strong argument for our thesis that college men have won their way into a dominant place in public and industrial life.

In view of these facts and in view of the further fact that modern life is almost wholly on a competitive basis, the ambitious young man is taking a tremendous risk who voluntarily chooses to dispense with what the school can do for him, supporting his hopes by instancing the careers of self-made men of the past generation.

If the function of the school is of such importance, it must be given time to do its work. It is unfair to make demands of any person or institution and at the same time deny the means essential to meet adequately those demands. Time, in opposition to the "short cut," is necessarily involved in the educative process. Every teacher of experience has had to meet this question frequently with tactful argument. Impatience upon the part of the pupil is due, of course, to his ignorance of the problem of education, but much more to his ignorance of the processes. He feels either that he is an exception—he is not—or that imperative reasons render it necessary for him to get into his vocation by a brief regime. The reasons which he gives are always interesting, sometimes plausible, but reputable schools and school men have no choice. Rigid standards must be maintained. Certification must mean something fairly definite. It is the reproach of our American schools that the Bachelor's degree represents nothing definite until the institution conferring it is known.

Educational experts may indeed find a way to abridge without loss the cause which admits to vocational training, or to the work of life. This they have attempted to do, confessedly without much agreement or success. It

is clearly a problem for the expert and not for the impatient student. We have not reached a finality in courses of study; we are not through with our discussion of school programs. As long as science is progressive and knowledge increases; as long as modern life continues to present new phases and the field of practical endeavor enlarges in this quarter and contracts in that, we shall reach nothing untimate in school programs. There must, however, be a regulative principle according to which the school proceeds to do its work. The educational expert may experiment continuously with methods, but he must not guess at aims; these he must know. He may modify educational means, but the aim cannot change. This is social efficiency—always, and he must have time to realize this aim.

The educative process should be characterized by present normal activity in order that it may lead by the most direct route to social efficiency. An error lurks in our frequent characterization of school as a preparation for life; it is life. Life is not something after and caused by the school, it has no artificial divisions. The familiar terms of our common speech are not sufficiently precise. We speak of "preparation for life;" the college course terminates with the "commencement," and the commencement orator tells the young graduates that they are now ready "to begin life." All this tends to objectify life, a conception which reflection will prove to be erroneous and mischievous. School life conceived of as representing present normal living is favorable to the best spiritual and practical results. Any preparation which sets up the ideal of living now, as a good; which does not detail the student from, but weds him to, interests which are to be his life interests; which regards righteous and wicked adolescence the normal antecedent, respectively of righteous and wicked manhood, is the best preparation for social efficiency.

The educational theories of Rosseau and his followers constitute extreme naturalism; our schools are withdrawing from the dangers of extreme artificiality. That exalted unduly the spontaneous; our educational practice must take care that it does not regard only the cultivated, the implanted as worth while. We plead for normal activity in the school because the school possesses the student during those years when the character of the brain through the sensory nerve is becoming fixed. He should therefore do and be now and here the thing which he will do and be as a man, not because it will sometime in the future be worth while to him that he has learned to be and to do this—important as this undoubtedly is—but because it is the thing to do now from present practical considerations. A view to the future career is helpful for disciplinary purposes and furnishes high motives.

There are many aspects of this doctrine of normal activity in the schools, but we shall briefly discuss but one, that which arises from the working of the law of habit.

The tendency to do an act increases by the repetition of the act. What

is once an act willed, becomes by casual or frequent repetition to have less and less of volitional quality, and before one is fully conscious of it, the act is repeating itself. Prof. James in his remarkable chapter on habit which is said to have been preached from a thousand pulpits, explains "that infinitely attenuated currents pour into the material roots; the brain is very plastic and peculiarly sensitive to these currents; once in, they must find a way out; they leave traces in the paths they make."

Other similar excitations travel by the same "brain path" and with increasing ease. In view of this, the serious practical consideration of the school is that it has control of this plastic material at a period when the opportunity is yet afforded to mould it to mark out these brain paths, to direct the tendency to repeat. Its high office is to inspire a line of noble conduct of life and thought which must at first be followed with conscious effort, next is followed subconsciously and next, meets no resistance—is has become second nature—it has become character, a settled tendency to right and appropriate conduct. What we do with pleasure, we are disposed to do again. The school should undertake to secure that what is pleasurable should be also good. In this way it can prepare for social efficiency—the ability to live a virile life among men and to do a full share of the world's work.

—C. H. Lane.

SELECTION AND TESTING OF SEED CORN.

Two very important factors to be taken into consideration by farmers who plant corn with the intention of obtaining large results, are the selection and testing of the seed. During the winter or very early in the spring is a very favorable time for testing the seed selected or that may be selected from the bulk of corn in the cribs. This matter is not thought of by many people until planting time and then it is too late, and low yields are gotten due to poor seed.

In the fall when the corn is ripe, is a very good time for selecting seed ears. The person who is to gather the ears may use a sack with a rope or leather tied to one corner and one side of its mouth. This rope or leather is then put over the shoulder, thus forming a satchel of the sack. He then goes through the field looking for stalks that have taken full benefit of the growing season, showing no signs of disease, well rooted, of medium size, having large uniform blades, the tassels well developed, showing the ability to produce large quantities of pollen, the ears about at the middle of the stalks; having deep set grains with large kernels; the cob of a medium size, large enough to support the kernels and attached to a shank several inches long. Stalks having suckers are not selected since suckers tend to take the food from the main stalk, and as a result the ears are not well developed. When the ear and stalk meet the demand of the

selector, the ear is pulled and placed in the bag and the work is continued until the desired amount is obtained.

The seed is then stored in the barn or a storehouse, where it is arranged upon shelves or tied on strings, where it can dry sufficiently to withstand the freezes and changes of temperature without damage. Damp air is not allowed to come in contact with the ears as they absorb moisture and this causes more or less loss from freezes and decay.

Corn when selected from the cribs, is selected as the feeder shucks the corn to be used for food. He piles the ears showing quality, with no evidences of mold, or weevil to themselves where they can be protected from cold and damp weather.

In the spring when the time for testing is at hand, boxes four to six inches deep and as large otherwise as desired are made. Sawdust or sand is spread to the depth of two inches in the bottom of the boxes and located so as to keep at a temperature that will germinate seed well. A piece of white cloth the size of the box is then ruled off in two inch squares which are numbered. These will accommodate four to six kernels laid side by side. This is then spread over the layer of sawdust or sand, the kernels or grains are then taken from each end and the middle of each ear. These grains are placed on a square and the number corresponding to the square is attached to the ear. Another cloth is spread over the kernels, which is covered with another layer of sawdust or sand. The entire box is heated to a temperature favorable for germination and kept in a warm room or cellar as near this temperature as possible for six or seven days. The top layer is then removed and the kernels examined to determine the percent that have germinated from each ear. If the percent in one square is not up to the standard set by the tester, the ear corresponding to this square is thrown out to be used for other purposes.

By selecting the seed at the proper time and preserving it with sufficient care during the winter and then testing for the percent of germination in the early spring, any farmer may increase his yield much more than enough to pay for his trouble.

—Judd Brooks, '12.

MOVEMENT TO ADVANCE AGRICULTURAL EDUCATION.

The young farmers attending the Short Course in Agriculture, now being given at the University of Tennessee have formed themselves into a permanent association for the purpose of spreading the "gospel of agricultural education" throughout the State. They are thoroughly aroused to the importance of scientific agriculture in the conservation and development of the natural resources of the country, and to the necessity of introducing more intelligent and improved methods of production and distribution.

The wealth of the world, and the sustenance of its inhabitants, rests at last upon the foundation of farm labor—and that labor must be carried on with intelligence, skill and efficiency to avoid national disaster. The most progressive among the agricultural classes who have broken away from the traditions, the prejudices and the ignorance of the past, and who go out from their homes in search of the knowledge which will assist them in their efforts to improve their farms and better existing conditions, are richly rewarded by the useful information and practical lessons they are learning in the short courses on agriculture.

These courses consist of lectures and demonstrations along every line of farm work, given by men of the highest intellectual caliber, who have of necessity had wide and varied practical experience, as well as scientific training, as the basis of their extensive knowledge. The average farmer—"who knows it all"—and the average man of the world—who thinks there isn't anything to learn about farming—have their eyes opened with wonder and admiration, when they begin to realize how much is now known and taught, as a result of careful experiment, in the modern application of science to agriculture. And the growing popularity of these short courses is attested by the fact that in many States of the North they are attended by over a thousand farmers every season.

The attendance in Oklahoma this winter was 500, representing all parts of the new State, where the highest number hitherto had been 425. It is said in that State many landlords paid the expenses of their tenants, figuring that they would more than make back the money expended in increased productions after their tenants had become imbued with higher ideals of agriculture. Two lines of work were kept going all during the course at the Oklahoma Agricultural and Mechanical College, which has just come to a close.

The attendance at the University of Tennessee this winter will not amount to more than seventy-five. The fifty progressive young Tennesseeans now gathered together from all parts of the State at this institution, realizing the great benefits to be derived from the Short Course, and appreciating the needs of the farmers of the present generation, have determined to unite in a concerned effort to reach every farm community in the State, and make known the advantages and opportunities offered to every farmer for enlightenment along his own particular line of endeavor.

The organization of the Agricultural Short Course Club of Tennessee was perfected last week at Morrill Hall, the agricultural building of the University of Tennessee. Phil S. Taylor, of Washington county, a nephew and prototype of United States Senator Robert L. Taylor, was chosen president of the club, W. P. Morgan, Jr., of Columbia, secretary and treasurer, and the following vice-presidents, who will have charge of the three divisions of the State: W. Armistead Collier, Jr., Memphis, West Tennessee, J. L.

Hogan, Jr., Nashville, Middle Tennessee; C. L. Wright, Morristown, East Tennessee.

These officers will constitute the Executive Committee of the club. Every county represented in the course will choose a vice-president, who will organize the work in that county. Those counties not represented at the university will be put in charge of men selected from among the number who have been in attendance on the short courses given at other points in the State—Jackson, Winchester, Cookeville and Dickson. The attendance on the last named courses this season amounted to 450 members—all of whom are eligible, and will be enlisted as members of the club.

The co-operation of Farmers'Institutes and Fair Associations throughout the State—as well as of the press—will be sought, and a systematic effort will be made to build up the membership of the club and increase the attendance on the short course.

The following resolutions were adopted setting forth the purposes of the club:

"We, the members of the winter short course class in agriculture at the University of Tennessee, of the year 1910, knowing that all wealth springs from the soil, and therefore that the continued prosperity and happiness of men and nations depend alike upon the fertility of the farm and the intelligence of the farmer, and recognizing the great benefits to be derived from co-operation in all the activities of life, do hereby declare our determination to form ourselves into a permanent organization for the following purposes:

"1. To better the general agricultural conditions of our State.

"2. To direct the attention of every farmer boy to the possibilities of the farm.

"3. To stimulate a desire for the solution of the problems that confront the farm.

"4. To develop an intelligent understanding of, and interest in, the live stock of the farm.

"5. To raise the standard of soil fertility and of crop production of the State of Tennessee.

"6. To aid each other in the attainment of useful knowledge, and in the practical application of more improved methods of cultivation.

"7. To increase the interest of the farmers of Tennessee in agricultural education, and enlist members for the University Short Courses from every county in the State."

With such high purposes and such real interest in the true welfare of the State and country, this association may develop into a movement of wide influence and power in the development of the most important occupation of man. By concerted action, it is believed that many of the overhanging clouds of ignorance and prejudice may be dispelled, and the farmer persuaded that he can not keep pace with the marvelous material progress

of the time without acquainting himself with the latest achievements of science, and applying in his own field the most improved methods of production. The modern farmer must be brought to realize the truth of the old saying, that we should test all things—new, as well as old—and hold fast to that which is good.

The short Course Club will hold its first reunion at the State Fair next September. The membership is as follows:

Blount County—F. H. Trent, Rockford, R. 1; C. C. Proffitt, Maryville; R. 2; L. B. Lowry, Maryville, R. 5; O. W. Rule, Louisville, R. 2.

Claiborne—W. S. Mayes, Tazewell, R.1.

Davidson—G. B. Woodward, Jr., Bosely Road, Nashville; J. L. Hogan, No. 9 Cummins Station, Nashville; J. H. Graham, 1305 Fifth Avenue; W. H. Caldwell, Nashville, R. 9, Station B.

Dickson—A. J. Byrn, R. 1.

Franklin—G. H. Taylor, Maxwell.

Gibson—R. M. Wiley, Newbern, R. 5.

Greene—C. L. Crosby Midway, R. 1.

Knox—E. L. Clark, 207 Eighth street, Knoxville; G. W. Cate, Fountain City, R. 1; J. O. Shaad, Knoxville, R. 1; A. McH. Russell Concord, R. 1. Wm. Jenkins, Knoxville.

Lincoln—R. E. Koonce, Fayetteville, R. 4; Samuel Davidson, Petersburg; A. C. Landess, Petersburg, R. 2; G. E. McAdams, Jr., Petersburg, R. 1; W. R. Whittaker, Mulberry.

Loudon—A. C. Montgomery, Greenback.

Montgomery—C. P. Warfield, Clarksville.

Madison—J. L. Bond, Jackson, R. 1; J. T. Philips, Jackson, R. 3.

Maury—W. P. Morgan, Jr., Columbia.

Putnam—S. T. Maddux, Buffalo Valley; Horace Jared, Cookeville.

Rutherford—W. M. Brown, Christiana.

Robertson—Roy Langford, Adams, R. 1; J. W. Murphy, Cedar Hill, R. 3.

Shelby—W. A. Collier, Jr., Memphis; P. L. Thornton, Memphis.

Sevier—G. B. Fox, Sevierville, R. 4.

Humphreys, G. E. Tubb, Waverly, R. 1.

Hawkins—R. E. Dobyns, Kingsport, J. S. Galbraith, Galbraith Springs.

Hardeman—S. A. Shearin, Bolivar.

Weakley—R. C. Burdette, Jr., Martin, R. 7.

Washington—E. D. Worley, Jonesboro, R. 4; P. S. Taylor, Embreeville, R. 1.

Wilson—M. H. Thompson, Henderson Cross Roads; W. P. Thompson, Lebanon, R. 9.

Hamblen—C. L. Wright, Morristown.

Williamson—A. L. Dean, Eagleville.

—The Nashville American.

EDITORIAL.

The article which appears on another page in this issue in regard to the organization of a club by the members of this year's Short Course in Agriculture gives one the feeling that perhaps this is the move at last which is going to count for much in interesting the farmers throughout the State in better agriculture. These courses have been conducted now for several years and despite the fact that every effort has been made to advertise them throughout the State and also that they are given free of all charge, still the number of students has not increased as it should have. It seems very difficult to convince the farmer that there does not exist a chasm between him and the University which it would be unwise if not dangerous for him to try to bridge. He has long been afraid of scientific farming but the movement started by this band of enthusiastic young farmers should serve the purpose of convincing many that after all the term scientific as applied to farm operations means but the application of plenty of practical common sense.

It appears that members of former courses failed to get the greatest lesson of all during their stay in the University, that of helpfulness to others, but these young fellows have been made to see the great possibilities that lie before them and have resolved to return home bearing the good news to their friends and neighbors in a quiet, unassuming manner.

Unfortunately there still exists in some farming communities a strong prejudice against farming as a vocation. Many a father who is a farmer by force of circumstances perhaps would prefer his son's entering any other profession rather than that he remain on the farm. His own education is sadly at fault. He has never reached the point where he can appreciate the good things which are within his grasp and the possibilities for his children. It is such communities as this that offer great opportunities for agricultural missionaries and it is to be hoped that every student in the course may enlist his earnest efforts in the cause and that they may go forth throughout the State making a bold and determined fight against the steady trend of the country boys to the city which is such an incessant drain on the life blood of rural communities that they can never hope to rise to rightful position until it is checked.

LOCALS AND PERSONALS

Hon. John Thompson, State Commissioner of Agriculture paid the University a visit January 25. He came to meet with the officers of the East Tennessee Farmers' Convention for the purpose ofarranging the program for this year's convention. During his stay he made an address before the members of the Short Course.

Among the officers of the East Tennessee Farmers' Convention who were at the above meeting were Hon. R. W. Reeves of Jonesboro, the president of the convention, W. G. Roberts of Athens, a former president of the convention, D. W. Duncan of Cleveland H. M. Wilson of Niota, W. B. Stokeley of Dandridge, John A. Jones, of Concord, H. G. Dail of Clinton, W. G. Lenoir of Philadelphia, and John C. Easterly of Parrotsville.

The Short Courses in Dairying and Horticulture have been well attended during the past two weeks.

Messrs. J. E. Converse and W. N. Rudd, who are assistants in co-operative experiments at Cookeville and McMinnville, respectively, were at the University during this month in consultation wth Professor Mooers regarding the work for the coming season.

The meeting of the Tennessee Berkshire Association which was held the 14th and 15th of the present month in the Hall of the Board of Trade in Nashville was well attended. Professor Morgan was present and made an address. The annual sale was conducted at the State Fair Grounds.

The buildings at the West Tennessee Experiment Station are now complete. They consist of a main building for offices, etc., a large barn including departments for both beef and dairy animals, and in connection with which is a 200 ton silo; a potato potting and greenhouse, an experimental-seed barn, a repair shop and a 5,000 gallon tank so situated as to supply amply the needs of water and protection in case of fire and supplied with water from a 110 foot well.

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LEGUMES AND SOUTHERN AGRICULTURE.

Introduction—The too long continued practice of growing corn and cotton throughout the South has so depleted the soils that to-day the most important question to Southern farmers is the restoration of their land to its former productiveness. Live stock farming will eventually solve the problem for them but due to present conditions its introduction must be gradual and so for the present the most available method of increasing the fertility of soils consists in the free use of leguminous plants, such as cowpeas, soy beans, hairy vetch, peanuts, crimson clover and numerous others. The true grasses will always furnish the bulk of the hay crop and the greater part of the pastures, but the cultivation of legumes is an essential part of all successful farming, on account of the marked effect which they have in fertilizing and preparing the soil for future crops. The parts of these plants which are above ground are valuable as food for stock and those parts which are below the surface are often of equal value as food for future crops. These plants, when grown under suitable conditions have specific enlargements on their roots, called root tubercles or nodules and the micro-organisms which live within these tubercles are able to assimilate the nitrogen of the air that circulates through the upper layers of the soil. This matter would not merit so much consideration were it not for the fact, that the world's supply of the two richest sources of nitrogen guano and saltpeter is being rapidly exhausted and due to this fact the prices are getting so high that for the general farmer the cost is often almost prohibitive.

Common Characteristics—The essential botanical characteristic that distinguishes the legumuosae from other plants lies in the structure of the fruit. It is the kind of fruit known to botanists as a "legume," being a simple pistil ripening into a dry pod that opens on both sutures and bears a row of seeds on the ventral side. The most typical of them have a papilonaceous flower as in the peas and beans and in the case of the clovers are dependent upon insects for polination. Most of them have compound leaves.

The roots of legumes have numerous small tubercles scattered throughout the root system which are infested by micro-organisms. The great agricultural prominence into which legumes have lately come is due to the

fact that these micro-organisms assimilate the free nitrogen of the air which is left stored in these tubercles where it may be of use for future crops.

Acquiring Nitrogen—Plants of this family the Legumuosae, when grown in contact with certain bacteria, form upon their roots small knots or nodules which, it is now conceded, play a very important part in furnishing to the plants nitrogen derived from the air. During the past century various theories have been advanced to explain the growth of legumes in soils nearly or quite deficient in nitrogen and the benefit to such soils from their growth, but it was not until 1886 that Hellriegel announced at a scientific meeting that the source of nitrogen for these plants was unquestionably the atmosphere. Two years later he, together with Willfarth demonstrated the fact that the growth of plants in soils free from nitrogen always occurred after the development of swelling or nodules on the roots. The results obtained by these two investigations have been fully substantiated by many other investigators. These nodules contain definite and characteristic micro-organisms which are the essential agents in the fixation of free nitrogen. The nitrogen assimilated by these organisms is in part appropriated by the crop which unaided is incapable of making any use of the free nitrogen of the air.

Lime for Legumes—Certain soils under certain conditions give greatly increased growths of certain leguminous crops when treated with an application of lime. This was proven in the case of clover at the Ohio Station and for alfalfa at the Cornell Station. It has long been held that lime assists the nitrification of organic matter by reason of furnishing a base for the nitrous and nitric acids formed, thus preventing the soil from becoming too acid for the proper growth of the nitrifying organisms. The Cornell Station found that not only was the size of the alfalfa plants greatly increased when lime was added but that the water soluble nitrates were also greatly increased.

Value—The value of leguminous plants has been recognized for many years due to the decided beneficial effect which they have upon the soil. Further, every farmer who raises live stock should grow legumes for forage, for by their use his native pastures may be reduced in area, and the productive capacity of his farm increased. They enable the farmer to secure green feeds at seasons of the year when they are most needed and when turned under furnish a very cheap but valuable form of manure for maintaining soil fertility. The continual increase in the price of commercial concentrated feed stuffs has made it necessary for feeders to turn to other sources in order to be able to feed profitably. This fact has turned attention to several of the leguminous plants due to the fact that they are as a class valuable as furnishers of protein. Several of the legumes have gained considerable prominence as green manuring crops because of the fact that they produce large quantities of forage

of good quality, either as hay or pasture and further have the ability to supply additional nitrogen to the soil.

Importance of Legumes in Southern Agriculture—Any system of agriculture without the use of a leguminous crop tends to lessen the productivity of the soil and makes necessary large outlays for nitrogenous fertilizers. With a leguminous crop grown at intervals the productivity may be maintained or even increased.

The great need of the South to-day is a system of farming by which the soil may be brought back to its former productiveness with as little outlay of money as possible. The institution of live stock farming will eventually solve this problem, but before live stock can be introduced extensively into the South the question of feed-stuffs must be solved, because due to the bad system which has been in common practice for so long, of growing one crop continuously, the yields have become so low that the maintenance of a herd has been a difficult proposition. In the past cotton seed meal and hulls have formed the principal food of cattle in the South, but the continual advance in price of these products with the annual products not advancing proportionately has made the question of producing food stuffs one of the greatest importance. A bulletin issued by the United States Department of Agriculture gives some interesting facts with regard to the use of legumes in building up a run-down cotton plantation into a profitable stock and hay farm. In 1905 this farm produced ¼ of a bale of cotton and 15 bushels corn per acre.

In 1906, after a crop of cowpeas it produced ½ bale of cotton and 37½ bushels of corn to the acre.

In 1907, after a crop of cowpeas it produced ½ bale of cotton and 34 bushels of corn per acre and after cowpeas and corn continuously for 2 years, 1 bale of cotton per acre.

Cowpeas were the most important factor in the improvement, but improved methods of cultivation which were introduced should receive some credit for the rapid increase of productivity.

—R. M. Murphy, '10..

SILAGE VS. COTTON-SEED HULLS

With the advance in market prices of food stuffs though they be by-products, our farmers are having their attention more and more called to the necessity of the farm crop that will more economically produce milk and beef.

In some experiments recently conducted at the West Tennessee Experiment Station a daily ration of 40 lbs. of silage (costing 6 cents) and 6 lb. of cotton-seed meal was fed against 25 lbs. of cotton-seed hulls (costing 9⅓ cents), and 6 lbs. of cotton-seed meal. Twenty-four steers were used in each feeding lot. Notwithstanding that the hull fed group costs 3⅓ cents per

head per day more or a total of $72.00 for 90 days this group only produced 86 pounds more weight than the silage steers.

In another group of 24 steers of equal weight each fed 30 pounds of silage and 6 pounds of hulls (costing 7 cents) and 6 pounds of meal per day, the gain over the silage steers was 279 pounds and over the hull steers 193 pounds. While larger gains were gotten from the 30 pounds of silage and 6 pounds of hulls there was still a difference of about $7.00 in favor of the silage steers when all were sold at 5¼ cents per pound. This showing is all the more remarkable when it is known that the silage was sold to these steers $1.00 per ton above the average price and the hulls were sold from $3.00 to $4.00 below the prevailing price of hulls at the time that cattle were fed. Richer lands with increased production will cheapen silage, but the advance of the weevil may increase the cost of hulls.

HOME MIXING OF FERTILIZERS.

Since there is such an enormous sum of money expended each year in the South for commercial fertilizers is would certainly pay farmers to investigate the matter sufficiently to find how near they are getting their money's worth. This statement was made but a few days ago by the editor of a prominent Southern farm paper, "Of the $50,000,000 paid for fertilizers in the South, it is not too much to say that over $11,000,000 is wasted through ignorance of crop and soil needs, a sum which equals the total public fund of six Southern states." This is a fearful waste, but the proposition seems not to be, to quit buying fertilizers, but to spend this enormous sum more judiciously. Undoubtedly one of the most fruitful sources of loss is to be found in the buying of ready mixed fertilizers. The average farmer has not enough general knowledge of the requirements of the soil of his locality.

Co-operative experiments have been carried out on practically every type of soil within the state so that the Experiment Station can now give out information which will indicate in a general way the especial needs of any given soil. With this advice in hand to supplement his own experience with his farm, the farmer needs only buy those materials which are needed to furnish plant food in the form required.

Generally the fertilizer agent comes around with his different samples one of which perhaps he calls "The Corn King," another "The Potato Special," another "The Wheat Grower," etc., while in reality the greatest difference often between the various brands he offers is the difference in price. He advises one certain brand for each crop, but almost invariably the formula on the tag reads 10-2-2 or something similar, which indicates a very low grade article and a mixture which cannot be made without the addition of a lot of filler on which the farmer must pay freight, but which has no value as plant food.

To illustrate, the following example is given. Suppose a fertilizer tag reads as follows: Phosphoric Acid, 10%; nitrogen, 1.65% and Potash, 2%; and the materials used in making the mixture are known to be acid phosphate, cotton seed meal and muriate of potash, how much will be required to make a ton of the mixture? If there are 10 pounds of phosphoric acid in each 100 pounds of fertilizer in one ton there will be 20x10 or 200 pounds. With a guarantee of 1.65% of nitrogen in one ton there will be 20x1.65 or 33 pounds of nitrogen and the 2 pounds of potash in each hundred equals 20x2 or 40 pounds per ton. Now, in one hundred pounds of cotton seed meal there is 6.56 pounds of nitrogen, so that the 33 pounds of nitrogen in the fertilizer, divided by 6.2 gives the number of hundred pounds of cotton seed meal required to furnish the nitrogen needed or approximately 503 pounds of cotton seed meal. This 503 pounds of cotton seed meal also contains about 14 pounds of phosphoric acid and 9 pounds of potash, since in every one hundred pounds of cotton seed meal there are about 2.8 pounds of phosphoric acid and 1.8 pounds of potash. To furnish the 200 pounds of phosphoric acid in the mixture it is necessary to supply with acid phosphate 200—14 or 186 pounds of phosphoric acid. If 16% acid phosphate is used, 186 divided by 16 gives the number of hundred pounds of acid phosphate required, which is approximately 1162 pounds. Since muriate of potash contains approximately 50 pounds of potash in 100 pounds and 40 pounds is needed less the 9 pounds in the cotton seed meal it is apparent that 62 pounds of muriate of potash was required to make up the balance of the potash. These materials combined give us the following mixture:

1162 lbs.	Acid Phosphate	186	..	..
503 lbs.	Cotton Seed Meal	14	33	9
62 lbs.	Muriate of Potash	...	..	31
1627 lbs.	Total	200	33	40

In other words, all the plant food contained in a ton of this fertilizer is contained in 1627 pounds and the manufacturer to make out the ton must add 244 pounds of earth or the like as a "filler." The farmers demand a low grade fertilizer and the manufacturer has no other purpose than to supply the demand at least cost, which is perfectly legitimate, so he is forced to buy some kind of material to make out the ton. This 244 pounds cost the manufacturer money and he incurs additional expense in mixing it, also the freight is more on a ton than on 1627 pounds, all of which the farmer must pay. The materials in this fertilizer, if bought separately at present prices would cost about as follows:

200 lbs. Phosphoric Acid at 5 cents	$10.00
33 lbs. Nitrogen at 19 cents	6.27
40 lbs. Potash at 5.5 cents	2.20
Total	$18.47

This grade of fertilizer generally sells for $26.00, leaving a difference of $8.47 in favor of buying the materials separately. The objection is often raised that the farmer cannot mix his fertilizer well enough to get satisfactory results, but as a matter of fact it makes no real difference whether the different ingredients are mixed at all or not, the only reason for mixing being the saving of cost in application.

The mixing of fertilizer consists simply in placing the materials on a floor or platform and shoveling them until a mixture of uniform color is obtained. Anybody can do this and a safe estimate of the cost may be placed at 50 cents per ton.

RECENT FALL AND WINTER AND CRIMSON CLOVER.

Two conditions have worked mightily against favorable results for crimson clover, not within recent years have we experienced a rainfall below the normal for August, September, October, November and December. Crimson clover following crops removed early in the fall demands plenty of moisture to get sufficient root to go thru the winter without heaving. Only on ground that had been fallowed from June or July and sowed in August has clover done well. Of course on well limed and rich lands (plenty of vegetable matter) under the rainfall conditions of even last year clover has come thru all right. But areas of just such rich land are scarce.

The other conditions, disastrous to a larger usefulness of the crop was the high price of seed last fall. This may be easily overcome by farmers raising their own seed. In former years large yields and fair money returns have been realized in East Tennessee from growing crimson clover for seed. We are glad to report more interest in the raising of seed of this crop and hope in the near future for a much greater supply of local seed.

The dry weather condition can only be overcome by the use of plenty of vegetable matter, which crimson clover supplies in abundance, or by light dressing of farmyard manure. Vegetable matter conserves water and plant food encourages soil bacteria, and discourages "spewing" or heaving We must have more vegetable matter for larger crop yields, better rotations, more legumes, and far much greater decrease in cost of producing necessary foodstuffs of the former.

BARNYARD MANURE.

Importance of Manure.

On the average farm to-day the manure heap is not given the consideration which it deserves as a factor in maintaining soil fertility. A well kept manure heap, though seldom seen, is one of the surest indications of the thrift and success of the farmer who possesses it. The common practice of

throwing the manure out of the stable against the side of the barn, directly under the eaves of the building is one of the most effective means the farmer could employ to advertise his shiftlessness and lack of appreciation of home resources. Experiments indicate that if all the farm animals were kept in stalls or pens throughout the year and the manure carefully saved, the approximate value of the fertilizing constituents of the manure produced by each horse or mule annually would be $27, by each head of cattle $19, by each hog $12 and by each sheep $2. The fertilizing value of the manure produced in the United States would therefore be worth approximately $2,400,000,000. These estimates are based on the values usually assigned to phosphoric acid, potash and nitrogen in commercial fertilizers without regard to the value of manure in improving the mechanical condition and drainage of soils which is fully as important as the direct fertilizing value.

If we assume that one-third of the value of manure is annually lost by present methods of management, and this is undoubtedly a conservative one, the total loss from this source in the United States as indicated by the above figures would be $8,000,000, or, according to Robert's figures, the annual loss for each farm would amount to $83.33. It is to be feared that the introduction of commercial fertilizers has increased to some extent the apparent indifference toward the care of manure, but the fact must not be lost sight of that at best they can only be used as supplements in connection with the manurial products of the farm.

Manure vs. Commercial Fertilizer.

Manure is so variable in its composition due to various conditions that it is hard to make a comparison with any great degree of accuracy. The following data is taken from the records of the Rothamsted experiments in growing wheat:

Wheat Yield in Bushels of Grain:

Plot	1879	1893	Av. for 51 yrs.
No. 2	16.00	34.25	35.7
No. 7	16.25	20.25	32.9

During this experiment plot 2 received an annual application of 14 tons of manure per acre while plot 7 received the equivalent in food elements in the form of commercial fertilizers. It will be noticed that in 1879 the yields on the two plots was practically the same and were very low but the record shows that during this season from March to June there was a rainfall of 13 inches and besides it was a very cold spring, conditions under which bacteria could not work. In 1893 there was a rainfall of but 2.9 inches during this same period and otherwise the weather was very hot. Under these conditions the yield on the manured plot was 14 bushels more than on the commercial fertilizer plot, showing the great advantage that manure has in retaining water. However, in an average of 51 years there was a

difference of only 2.8 bushels in favor of manure, due to the great variation in seasons. At the Ohio Experiment Station an experiment was begun in 1894 in which three one-acre tracts were set apart for the continuous culture of corn, oats and wheat. In this test one plot for each crop received annually 2½ tons of open-yard manure and an adjoining one double that quantity, 4 plots received different combinations of a complete fertilizer and 4 plots were left continuously unfertilized. Below is given a comparison of the results from the manured plots, with the most effective chemical combinations, an average for 13 years:

Crop	Manure		Chemicals	
	Grain	Straw or Stover	Grain	Straw or Stover
	Bu.	Lb.	Bu.	Lb.
Corn	17.10	663	21.79	897
Oats	11.24	462	20.45	957
Wheat	5.92	807	10.57	1238

This experiment indicates an advantage in favor of the fertilizer, but it must be considered that this is a comparison of the most effective fertilizer with manure which had been exposed to the weather in an open yard for from 3 to 6 months and shows, as might be expected, that the elements left in such manure are less effective pound for pound than the least active forms of commercial fertilizers. A combination of this experiment showed each year a marked increase in the crops from both fertilizers and manure but, while in the earlier years the manure produced a much smaller increase than the fertilizers, the gain from the manure increased at an accellerated rate while the rate of gain from fertilizers appeared to be diminishing.

Composition.

The value of the manure produced is effected by a great many different things. Both the age and the kind of animal are factors which are to be considered. Young animals have more active assimilative anad digestive power than older ones and further they require more of the mineral elements in the formation of bones, etc., than do mature animals, hence their excrement are poorer in fertilizing elements. Cows in full milk return in their excrements only about 65 to 75 per cent, while fattening animals return 85 to 90 per cent of the fertilizing elements of their food.

The kinds of food consumed modify the composition and value of the resulting excrements. If a ration containing a sufficient supply of carbohydrates and a superabundance of proteins be fed the excrements will be more valuable and contain a larger relative percentage of nitrogen than they would if the ration were poorer. Animals liberally fed produce richer excrements than those which are underfed.

Manure is also affected by the kind and quality of bedding used. If

the bedding is poorer than the excrement, which is generally the case, the more bedding used the poorer will be the percentage of manurial value. However, bedding may be used not only to promote the comfort of the animals but it may also be of much value in absorbing and holding the liquids of the manure. The different materials generally used as absorbents range in value as follows: peat, pea straw, oat straw, rye straw, wheat straw, sawdust and leaves. When straw is used it is of much more value if cut short.

Another very important factor influencing the value of manure is the method employed in collecting, preserving and utilizing it. If care is not taken to prevent leaching by rain and undue fermentation one-half of the fertilizing value may easily be lost and that, too, the most available part of the elements contained.

In composition the liquids are by far the most valuable part of the excreta, for they contain those fertilizing constituents which have been digested and are largely soluble. In the experiments at the Pennsylvania Station it was observed that about one-half of the nitrogen and three-fourths of the potash voided was in the urine, while it contained practically none of the phosphoric acid. It is difficult to state an average of the composition of manures, but it may be placed, when preserved under ordinary care within the following limits: Nitrogen, .4—.8; Phosphoric Acid, .2—.5; Potash, .4—.8. Snyder gives the following averages: Nitrogen, .5%, Phosphoric Acid, .35% and Potash, .5%, so it is sufficiently accurate to estimate that well kept manure will contain ½ percent or 10 pounds per ton of nitrogen and potash and ⅓ percent or 6⅔ pounds per ton of phosphoric acid.

(*To be Continued.*)

MARCH AS A SEEDING MONTH.

With some crops, seeding in March is a gamble. Looking up the weather reports for this vicinity for the last 39 years we find 15 years during which the temperature went to 20 degrees above. This is sufficient to seriously affect many spring crops on average Tennessee lands. Their stands of grass and clovers on poor soils are invariably the result of just such weather.

This is not all. Eight years out of the last 39 the temperature in March has gone down to 15 degrees above. One year it went to 6 degrees above and one year to 5 degrees above. The advantage of early seeding would warrant our risking the chances of a 5 or 6 degree temperature but with many crops we cannot afford to risk early sowing when 15 years out of 39 the temperature may go down to 20 degrees above and eight out of 39 the temperature may go to 15 degrees above.

BENEFITS OF A COURSE IN DAIRYING.

This is an age of opportunities for the American boy. To no other young man is such a chance offered as to the boy on the farm, or to him who is thinking of going into the dairy business as is offered to the young men of today. The time has come when Tennessee as well as the whole South must awake to the realization of the possibilities in this particular business. We, situated as we are, here in the very heart of our great Southland, with all the conveniences of climate and location, are importing millions of pounds of butter every year. Young men, think of this! Think of the great responsibility we have resting upon us—that is the feeding of our rapidly increasing population. Why is it that so few of our boys and young men are interested in the dairy business? For the reason that so few of them know of the great field of opportunity that lies in this work. The great men of our nation and of our state have our interests at heart. They see before us the shoals of disaster, and are working hard to prevent our foundering upon the rock of ignorance. We must co-operate with them and endeavor to become educated along the lines of agriculture.

Our State University today offers to every boy and girl, man or woman in this State, without any cost, a practical and theoretical course of training in every branch of agriculture. The gate of opportunity is open and it is up to you to bestir yourself and take advanatage of it.

You might ask what is the use of attending this course and what are the advantages derived? I could ask also, What is the advantage of a man being trained for a physician, lawyer or for any vocation in life? Is it not the well trained man that usually succeeds most in life?

In taking this course you are under the direction of the best and most thoroughly trained men our State can afford. They take up the practical side of this work and impart to you the result of actual experience combined with theory and science. You are taught the value of different feeds, how to proportion them to get the best results, how to rotate the crops so as to get the best yields, how to select seed, and the most economical method of harvesting these crops. You are also taught how to select, raise and care for a dairy herd, how to manufacture and market the dairy products. In fact everything pertaining to dairying is given to you in the most practical and up-to-date manner. You also get instructions on the diseases of live stock and how to treat or prevent them.

This course is worth many dollars in money and a vast amount in pleasure and satisfaction to any man or woman who is in the dairy business.

I have been a member of the short course class this year and can truthfully say that my eyes have been opened wider than ever before regarding these and other important subjects. Many invaluable facts about the soil, the crops and their adaptability to different conditions have been revealed to me. I have been enabled to make a study of all the farm animals and their

relation to the soil, to plants and to mankind. Especially interesting to me has been the practical and theoretical teachings on the subject of dairying and dairy products. This industry is in dire need of thousands of good men today, and I believe that this short course, if followed by practical application, will be the key to greater success for any one who intends to make it a business in life.

—W. M. Brown, Short Course, 1910.

1910 SHORT COURSE CLASS.

Not in the history of Short Course work in the University of Tennessee has there been such a class. In numbers, state representation, preparation and possibility this class easily leads all former classes. There were no apologies to be offered because they had chosen lives upon the farms of the Volunteer State. On the contrary, the opportunities of farm life appealed to every man, and they came with the sole purpose of gaining knowledge which would assist them in recognizing every opportunity for improvement. There was considerable changing at the end of each course, some going home with the special lesson they had come after and others coming to take their places and seek instruction along other lines, but there remained throughout the whole course enough men to maintain a spirit of enthusiasm rarely excelled by full course students. This enthusiasm reached its climax in the organization of the Agricultural Short Course Club, mention of which was made in the last issue of the Farmer. These fellows have it within their power to render the University service of inestimable worth if they but only spread the good news when they return home and every indication points to the belief that they will live up to their chosen motto "200 students for the 1911 Short Course."

* * * * * * * *

The following is an expression of one of the students of the Short Course, Mr. E. L. Clark, of Newport, Tenn.:

One learns much about soils—how to rebuild them by the use of commercial fertilizers, crop rotation and the feeding of live stock. Under this head we are shown that we of the South have sold our fertility in the form of cottonseed meal, corn and wheat to England and other countries, and that we have gone as far in that direction as we can and now we must go to rebuilding our depleted soils. We are shown that barnyard manure is the natural soil food. One will be instructed how to combat insect ravages on growing crops by a knowledge of their life habits—attacking them in their weakest stages. Some insects are our friends as well as some our enemies. We learn how to distinguish them. We learn how to keep the little pests in check for crop rotation.

Inoculation of soils for the different legumes is made plain.

Seed corn selection is gone into and the score card explained by corn-judging practices.

Diseases of animals are dealt with extensively and remedies and preventives explained.

The growing of home-grown feed and the composition of same, enabling one to feed to the best advantage, is a subject little understood by us and is of momentous importance.

Then there is dairying, with its vast possibilities of money making and soil building. The short course will make you familiar with all of its workings and fill you so full of its merits that you will go to getting dimensions for a silo—a very necessary side to a dairyman's business.

Those interested in truck and fruit growing will find in the lectures given and the practice of pruning vines and fruit trees, budding, spraying and harvesting more than can be obtained in any other way in so short a time.

The farmers of Tennessee ought to be familiar with the principles taught here. You can get them; you have the building, library, experiment farm, dairy herd and dairy, and the instructors. Come and you will be treated with concern and interest. You will find men in charge who are devoting their lives to the betterment of Tennessee. You will be proud that you know them—be a better man from that fact. Let them help you on life's way.

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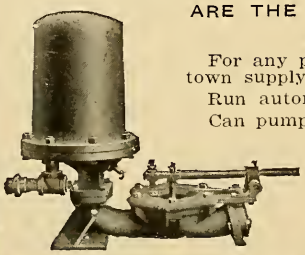

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The Call of the Nation

The call of the nation is agriculture.

Population increasing. Average crop yield decreasing.

The gay, gaudy, gilded city is the candle which lures the human moth into its belly, and by this sign the "producing army" is depleted while the "consuming army" is multiplied. Humanity is manacled to the "bread line" by chains that will not break. The "staff of life" is a preserver of the peace.

Hungry men have but little respect for law.

At winter's threshold the price of meat and bread ascends, while the wages of him or her who toils by day or hour, remains the same.

The tide must turn. "Back to the country" must be the slogan, else the nation will not feed itself.

Many who throng the street and narrow alley must away to the fields.

Some who work beneath the roof must go out and toil beneath the sky.

Some must go back and help to plow and farm the earth.

Supply is not keeping pace with demand. The farmer is failing to supply two families in the city while he keeps his own besides.

The farmer sells everything he grows at prices beyond his dreams, but still the cry goes up for more.

No nation was ever overthrown by its farmers.

In the cities hang the red lights and danger signals of this republic.

Other nations have found that high prices and unsatisfied stomachs were tokens of decline and decay.

The farmer must save the country by growing more corn on an acre of ground next year than he did this.

He must prevent his fertile field from becoming a barren waste.

France is the creditor nation of the world. Prosperity abides with her.

France maintains 45,000 rural schools with agricultural departments, with gardens and small fields, where systematic, scientific cultivation and conservation of the soil is taught.

For thirty-six years every school in Belgium has maintained at least one-fourth of an acre to instruct the pupils in the fundamental principles of farming.

On the roll of honor, in the magnificent and imposing Congressional Library building at Washington, Elihu Vedder placed "agriculture" first of all the arts, sciences, professions and occupations.

"The Call of the Nation" is for the best and most intelligent system of agriculture that is possible.

A. P. SANDLES,
Secretary Ohio Board of Agriculture.

THE U. T. FARMER

Vol. IV. APRIL, 1910 No. 7

SEED TESTING

In order that the Tennessee farmers might know what kind of agricultural seed they were buying for planting, as regards the varieties and quantities of weed seeds contained, and the vitality of the seed, the last legislature passed a law providing for the inspection of seeds by the Commissioner of Agriculture. It provides that every package of agricultural seed of one pound or more offered for sale within the state shall bear a label in English showing the name of the seed contained, the name and address of the dealer, a statement of the purity of the seed contained, and the locality where the seed was grown and when grown. The law also provides that no agricultural seed shall be offered for sale if it contain more than one seed to ten thousand of the following weed seeds: Wild mustard, or charlock, quick grass, Canada thistle, wild oats, clover and alfalfa dodder, field dodder, corn cockle, sour dock, wild onions, and oxeye daisy. There is some doubt as to what is meant by "sour dock," but it is supposed to be the same as "field sorrel." (*Remex acetosella*), mentioned in another part of the law. The law provides that the label shall indicate the per cent. of certain other common weed seeds and inert matter if they exceed two per cent. by weight of the whole. By inert matter is meant dirt, sticks, stones, broken and dead seeds, and other weed seeds not mentioned as prohibitive, or as impurities. The law provides further against the adulteration and misbranding of seeds offered for sale under the name of pure seeds. The Commissioner of Agriculture is intrusted with the enforcement of the law.

The farmer, if he desires, can make seed tests in his home, while it is not easy to make a purty test, the farmer may become acquainted with the seeds he ordinarily uses so that he can tell whether or not the sample in hand contains any considerable quantities of weed seeds or inert matter, and with a little practice, he may be able to identify the most common weed seeds. This can be done by spreading the sample out on a white sheet of paper and examining it carefully. A good hand magnifying glass will be found very useful in this work. The seed should be separated into three piles; one pile containing the good seed of the desired kind, one the weed seeds of whatever varieties, and one

all the inert matter. Weed seeds of any kind should be looked upon with suspicion, but if the per cent. is large, or if there is a trace of the most noxious weeds, it should be rejected. It is surprising how large a quantity of weed seeds are sometimes found in commercial seeds. Most of our noxious weeds have been scattered in seeds purchased in the markets. Many of the fields in the state are overrun with weeds introduced in this way. Dodder, which is so often present in clover and alfalfa fields, is a most pernicious weed, and when it has once gained a foothold, it is a very difficult matter to eradicate it.

A germination, or vitality test is more easily made than a purity test. This can be done either by the blotting paper or cloth method, or by the sand method. For the first, take pieces of blotting paper about five inches square, or cloths folded to about that size, or even newspapers folded so as to make a pad. Count out some definite number of seed, say about two hundred, and spread them out upon the pad so they are not in contact with one another. If the seed are clover or any other of the naked seeds, cover them with another layer of papers or cloth. The covered seeds like the grasses are left exposed. The whole is placed on one dinner plate and covered with another after being moistened, and put behind the kitchen stove, or in some other warm place. The papers must be kept moist, but not soaking wet. After a period of four to six days for the clovers, and of twelve to eighteen for some grasses, count the seeds that have sprouted and estimate the per cent. of germinable seed. A sample of seed that has a low vitality, or has large quantities of weed seeds or inert matter, should be rejected as of low value, even if the weeds are of harmless kinds.

The second method of testing the vitality of seeds is by using sand instead of papers or cloths. Provide a shallow box of clean sand. Count out the seed as before and plant them in the sand, covering lightly. Place the box in a warm place. Count the plants that come up and estimate germinable seed as before. By this method, something can also be learned as to the vitality of the plants grown from the seed. After the plants have been growing in the sand a few days, plants from good healthy seeds will be larger and more vigorous than those from poor and immature seeds.

The law above mentioned was passed to save the farmer from loss due to imitations from seedsmen. Formerly it was the custom of many unscrupulous seedsmen to mix inferior seed with good seed, or even to adulterate the seed with some other variety which resembled closely the more valuable kind. Large quantities of weed seeds were once imported for this purpose. They were also in the habit of mixing inferior seed with good and selling the whole at the price of good seed. Seed growers were in the habit of putting upon the market seeds from fields infested with weeds. Even yet the last offense is a very common one. Many states have paassed laws regulating the marketing and handling of agricultural seeds. While the Com-

missioner of Agriculture has the enforcement of the law in his hands, the farmer can greatly assist him by demanding from the dealers nothing but tested seeds, and insisting upon seeing the label which the law requires the dealer to place upon each package of one pound or more offered for sale. If the farmer takes these precautions, there will be no need of making his own tests before buying the seed for planting. Otherwise, he would do well to test a sample of the seed both for purity and vitality before purchasing.

—S. H. Essary.

BROOM CORN

Every year a great many farmers are influenced to undertake the growing of broom corn by the apparent prospect of large profits. There have been so many instances of where men have undertaken propositions of this kind without first becoming thoroughly familiar with details that this word of caution is given out. The ease with which the crop can be grown to harvesting condition and the fact that a fair crop is one-third ton per acre make the industry apparently lucrative even at the ordinary price, which is about $80 per ton.

In 1881 Illinois grew 17,887 acres and the price was $128 per ton. The next year 43,036 acres were grown and the price was but $80 per ton. This great fluctuation in price, while due to a large extent to overproduction was also due to the production of a large amount of brush of inferior quality. Any one who starts in this business on a large scale by planting a large field with but limited experience regarding the crop and the methods of handling it is almost sure to produce a large amount of poor quality of brush. Only when the crop is given careful attention in every respect does it pay well and it requires more attention than a crop of corn or wheat.

Broom corn is divided into two groups, the standard, which grows to a height of 10 to 15 feet with a brush from 18 to 28 inches long and is used for making large and medium sized brooms, and the dwarf, which grows 4 to 6 feet high, producing a brush 10 to 18 inches or more in length, and used for making small hearth brooms, whisk brooms, etc.

The latter, when of good quality, commands the higher price but the yield per acre is not so great. There are a great many different names of varieties used by seedsmen but many of these are simply new names applied to old varieties and do not represent varieties which have been sufficiently improved to deserve special designation. It matters but little what variety is grown but especial attention should be paid to the quality of the seed and what is more important, to the quality of the brush from which the seed was selected. Under no circumstances should the seed be taken from the

scraper when a crop has been harvested for brush for not only is germination likely to be poor but the average broom corn field entains many different strains, some of which are highly undesirable. Not infrequently there are found in such fields heads which resemble sorghum or Kaffir Corn more than they do broom corn and are of no value whatever for broom making. Such heads may easily be accounted for in case the broom corn from which the seeds were taken was grown near a field of sorghum or Kaffir Corn, due to the readiness with which they cross. Perhaps the best method to pursue in beginning the cultivation of this crop in a section where it has not been tried is to experiment the first season with small quantities of seed from reliable sources. These different lots should be planted far enough apart to prevent cross-pollination and at blooming time all but the very best heads should be cut out and then the different lots compared as to their desirable qualities. The superior plants remaining in the plat decided upon as having produced the best brush should be allowed to ripen seed and this can be used in planting a crop the next year.

The broom corn plant is not specially sensitive to climate and soil and may be grown profitably on any good soil within the corn belt but it does best in a warm climate where there is sufficient rain in the early part of the season to produce a strong, vigorous growth. However, it is essential that the weather be dry at harvesting season, for rain at this time will cause much of the straw to turn red, which reduces the market value about one-half, or rain upon the crop after it has been cut will cause it to bleach and lose its fresh green color. From the standpoint of profit also this is essential because since it takes so much labor to harvest the crop, it is necessary that the work go on uninterrupted.

The profits in growing broom corn depend so largely upon the methods employed and the cost of labor that it is not possible to make an accurate estimate but the great risk of loss due to bad weather and the extra care necessary at harvesting time make it a less desirable crop to grow than corn unless a greater profit may be derived. There is enough broom corn produced in the United States at present to supply the demand but the quality is sadly deficient and here lies the greatest opportunity. A person who contemplates going into the business should correspond with manufacturers and find out the quality of brush desired and should, if possible, sell direct to the manufacturer. It will seldom be advisable for a single person in any locality to begin such an enterprise because he will not be able to produce enough to create a market in his locality nor can he afford to purchase the different machinery necessary to prepare it for the market.

RATES AND DATES OF SEEDING FOR FARM AND GARDEN CROPS FOR THE STATE OF TENNESSEE

By C. A. Mooers.

How much seed to plant and when to plant it are questions often asked by professional farmers and gardeners as well as by amateurs. The major part of the data relating to farm crops, as given in the table which follows, has been prepared from the records of the University of Tennessee Experiment Station at Knoxville. For the garden crops some of the leading Knoxville market gardeners were consulted and special thanks are due to Messrs. A. H. Dailey, A. J. McNutt, C. M. Emory and Paul Webb. That all of these well known gardeners would subscribe to the following table in every particular is doubtful. The fact is there are many conditions such as peculiarity of season, texture and fertility of soil, care in preparation of land, system of cropping and various objects to be gained which modify both rate and date of planting. The information presented is therefore to be considered only as an attempt to give a trustworthy guide. Mention should be made that the rates of seeding for the garden crops were taken in large part from Bailey's Horticultural Rule Book.

To make the data relating to time of seeding and of transplanting applicable throughout the State. Bulletin 87 of the Tennessee Experiment Station on the relation of the Weather Service to the Farmers of Tennessee by J. F. Voorhees, should be consulted. Charts III and IV of this bulletin are especially valuable in this connection and the proper changes, if any, for different localities can easily be made by inspection.

A—GENERAL FARM CROPS.

Crop	Rate of seeding per acre	Favorable dates of Seeding.	REMARKS
Alfalfa	20—30 lbs.	Aug. 15—Sept. 7	Not advisable to sow in spring.
Barley, winter	2—2½ bu.	Sep. 15— Oct. 7	May be sown last week in August for pasture. Spring barley of little value.
Broom Corn	3—4 lbs.	May 15—30	Standard—3½ ft. rows with 1 stalk every 3 in. Dwarf— 3 ft. rows with 1 stalk every 2 in.
Buckwheat	36—48 lbs.	July 15—30	
Clover			
(1) Alsike	6—8 lbs.	Aug. 15—Sep. 7 also Mar. 1—15 or earlier.	
(2) Crimson	16—20 lbs.	July 15—Aug. 20	May be sown later under favorable conditions.
(3) Red	10—12 lbs.	Aug. 15—Sep. 15 also Mar. 1—15	
Corn	3—5 qts.	April 15—May 5	Often risked earlier. May be planted to middle of June.

Crop	Rate of seeding per acre	Favorable dates of Seeding.	REMARKS
Cotton	1½—2 bu.	May 1—10	An excessive quantity of seed used and plants chopped to the proper stand.
Cowpeas	1½—2 bu. broadcast ½ bu. in rows	May 20—June 20	Whips and New Era may be planted as late as July 7.
Grasses			
(1) Bermuda	8—20 lbs.	May 1—30	Pieces of sod and runners generally used.
(2) Ky. Blue	40 lbs.	Jan. 1—Mar. 15 also Sep. 20—Oct. 15	
(3) Meadow fescue	50 lbs.	Sep. 1—15 also Mar. 1—15	
(4) Orchard grass	35 lbs. for hay 15 lbs. for seed	Mar. 1—15 or earlier	
(5) Red top	12—18 lbs.	Sep. 1—Oct. 10 also Mar. 1—15	Often sown at same time as wheat.
(6) Rye grasses	50 lbs.	Sep. 1—15	
(7) Sweet vernal	30 lbs.	Sep. 1—15	Use only in mixtures 2—3 lbs.
(8) Tall oat	33 lbs.	Sep. 6—30 also Mar. 1—15 or earlier.	
(9) Timothy	12—18 lbs.	Sep. 15—Oct. 10 also Mar. 1—15	Often sown at same time as wheat.
Japan Clover	20—30 lbs.	Apr. 1—30	
Kaffir corn	5—6 lbs. for seed 10—12 lbs. for fodder	May 15—30	
Millet	2—3 pks. for hay 5—8 lbs. for seed	Apr. 15—July 15	For seed plant early in 3 ft. drills and cultivate.
Oats			
(1) Spring	2—2½ bu.	Feb. 20—Mar. 15	
(2) Winter	2—2½ bu.	Sept. 15—Oct. 1	
Peanuts	2 bu.	Apr. 20—May 20	Plant in 26—28 in. check rows two kernels to hill.
Rape	3—5 lbs. broadcast 1—2 lbs. in drills	Mar. 1—15 also Sep. 1—20	
Rye	1½—2 bu. for grain 2—3 bu. for pasture	Oct. 1—30	For orchard cover crop sow August 15—30, also may be sown any time in August for pasture.
Sorghum	10—12 lbs in rows for forage 90—110 lbs. broadcast 3—4 lbs. for either syrup or seed	May 15—June 15	
Soy beans	½ bu. in rows 1½ bu. broadcast	May 1—June 30	May be planted from April 15 and early varieties as late as last week in July.
Tobacco	"Heaping table spoonful for 100 sq. yds." sufficient for 6—10 acres.	Feb. 1—28	Seed sown in specially prepared beds. Transplant to field May 15—June 10.
Velvet bean	1 bu. broadcast	May 1—30	Plant in 4 ft. check rows 2 seed in the hill. Does not mature in this state.

Crop	Rate of seeding per acre	Favorable dates of Seeding.	REMARKS
Vetches			
(1) Alone	20—40 lbs.	Aug. 15—Sep. 15	Will survive winter when sown any time in October.
(2) with oats, etc.	15—20 lbs.	Sep. 15—Oct. 1	
Wheat	1—1½ bu.	Oct. 10—20	
Garden Crops			

B—GARDEN CROPS.

Asparagus	4—5 lbs. or 1 oz. to 50 ft. of drill	Mar. 1—15 or earlier	Roots transplanted in November or any time in winter.
Beans			
(1) Bunch	1 bu.	Apr. 15—Aug. 10	Soil must be warm in particular for limas.
(2) Pole	10—12 qts.	April 24—July 4	
(3) Lima		May 1—30	
Beets	5—6 lbs.	Mar. 1—15	Often planted earlier also any time up to August 1.
Cabbage	¼ lb.	Oct. 5—15	In cold beds for extra early. Transplanted to field Feb. 1—28.
		Jan. 1—31	In hot beds. Transplanted to field Mar. 1—15.
Cantaloupes	2—3 lbs.	May 1—July 1	For succession also as late as Aug. 12.
		Apr. 15—30	For extra early.
Carrots	3—4 lbs.	Mar. 1—20	
Cauliflower	1 oz. for 1,000 plants	Feb. 10—20	Start in hot bed. Transplant to field Mar. 15—Apr. 1.
Celery	¼ lb.	Feb. 20—Mar. 20	Sow as early as possible in spring. Transplant to field in July and August.
Cucumber	2 lbs.	May 1— July 1	For succession as late as August 12.
		Apr. 15—30	For extra early.
Egg plant	1 oz. for 1,000 plants	Feb. 1—15	Start in hot bed. Transplant to field May 1.
Horse radish		Mar. 15—Apr. 15 (roots)	
Kale	3—4 lbs. broadcast	Aug. 20—Sep. 20	On extra rich land may be sown October 1—30.
Kohlrabi	⅓ oz. for 100 ft. of drill	Feb. 10—20	Start in hot bed. Transplant to field April 1.
Lettuce	1 oz. for 1000 plants	Mar. 1—15	Or earlier in open field. Any time throughout summer for succession also throughout winter in hot beds.
Mustard	1½—2 lbs.	Feb. 20—Sep. 15	
Okra	8 lbs.	Apr. 15—May 10	
Onions*			
(1) 5—6 lbs. se	ed in drills	Feb. 20—Mar. 10	Or as early as possible. For spring use set large Danvers in field August 15—Oct. 15 and potato onions October 15—November 15.
(2) 30 lbs. seed	broadcast for sets		
(3) 6—12 bu. s	mall sets.		
(4) 100-150 bu,	large Danvers		
Parsnips	4—6 lbs.	Mar. 1—15	
Peas	1—2 bu.	Mar. 1—15 or earlier	
Pepper	¼ lb. or 1 oz. to 1,500 plants	Feb. 1—28	Start in hot bed. Transplant to field April 20—May 10.

*Hardy vegetables such as onions, spinach, mustard, lettuce, peas and also Irish potatoes are frequently planted to advantage during any warm spell in January or February

Crop	Rate of seeding per acre	Favorable dates of Seeding	REMARKS
Potatoes			
(1) Irish	7—8 bu.	Mar. 1—15 or earlier.	
(a) Early			
(b) 2nd crop		July 15—Aug. 5	
(2) Sweet	4—5 bu.	Mar. 15—Apr. 1	Start in hot bed transplant to field April 20—May 15. Do well when transplanted up to June 15.
Parsley		Mar. 1—15 or earlier	
Pumpkin	4—5 lbs.	May 1—15	
Radishes	8—10 lbs. in drills	Mar. 1—May 15	For winter radishes plant August 10—20.
Rhubarb		Mar. 1—15 or earlier	Roots may well be set any time in winter.
Rutabaga	3—4 lbs. broad cast 1—2 lbs. in drills	July 1—30	
Salsify	8—10 lbs.	Mar. 1—15	
Spinach	10—12 lbs	Mar. 1 or as early as possible also Sep. 1—30	When weather is cool.
Squash			
(1) Bush	4—6 lbs.	Apr. 15—30	For extra early.
(2) Running	3—4 lbs.	May 1—15	Safe dates for all.
Strawberry plants		Mar. 1—30 or earlier.	
Tomatoes	¼ lb.	Feb. 15—28	One month earlier if to be shifted twice. Set in field April 15—30 for extra early. May 1—June 15 safe dates.
Turnips	3—4 lbs. broad cast 1—2 in drills	Aug. 1— 10	
Watermelons	4—5 lbs.	May 1—June 10	

AGRICULTURE IN THE PUBLIC SCHOOLS

By L. R. Neel, '07.

That the agricultural colleges and the agricultural departments of state universities are doing a splendid work and that they are paying for the investments are facts admitted by the thinking public. But the exact status of agriculture in the public schools is not so well established. This new department of instruction, in the lower public schools, has been adopted by some boards and its praises have been sung by the public and the press on general principles and not because it was realized just how this department was to justify its existence (if it's existence was to be justifield.) In the same spirit corn clubs and other agricultural contests and fairs for the youthful farmers have been inaugurated and "boosted." Fortunately some one did some sound thinking and originated these things for agricultural uplifts for the young people so (we believe) that

too much praise has not been sung for agricultural education, for that is what it all is to amount to if these enterprises do their work.

We have been rapidly coming to the idea that our schools from the lowest to the highest should help us with our life problem as well as train our minds and give us a little of cultural information. Often as we say it and hear it said, we do not rightly appreciate the fact that this is an age of specialists and that he who concentrates his energies from an early date has far the best chance for success. The boy who is to be a farmer should commence early to learn the lessons of the farm and to learn them accurately, for learn them in some fashion he will. This study of the professional at such an early age will not detract from the joys of early life; the study of agriculture possesses more of interest than the study of Latin, geometry, ancient history and grammar to the average boy. The same line of argument holds good for training along other vocational lines.

The argument of the above paragraph cannot be got around; our schools should train for life, the country boy should be taught farming and this teaching of "a bread and butter" subject should not make him less happy. But what can be expected of the public schools in this line? Can agriculture be taught successfully in the public schools? These are pertinent questions and they can be answered more accurately in a few years than at present. But some light can be thrown on them now. We, with confidence, say that agriculture is being taught with a purpose and that a gratifying degree of success is being achieved. The money that is being invested in teachers and equipment for the agricultural departments of the public schools is being well spent. In a few years we will be able to make comparisons of the farmers trained in the agricultural schools with those who did not have this advantage. But now, in the South particularly, we must reason from cause to effect. For instance, in one agricultural high school in which this subject was just established last year, the verdict of one of the pupils a few weeks after the agricultural department had begun operation was, "I have found out that we do not know how to farm." This was not a quotation of the teacher's expression, but a conclusion of the pupil after having a "plumb line" placed beside the methods he was acquainted with. No good farmer will differ from the decision reached by this high school pupil. I believe that if our boys could forcibly realize the fact that the larger part of our farmers do not know how to farm, this alone would be worth untold sums to the country. They would then be in an attitude to learn. In this same school the pupils come from farms that are low in humus and on which a crop is never intentionally given to the land. The first lesson that was taught was that the soil is made up of particles of rock, and particles of vegetable and animal matter, the last named material being of much less importance than the former two. They were taught that vegetable matter must be present

in a fertile soil, that it is constantly disappearing from the soil so that if the supply is to be increased or even maintained, stable manure, sod, or green manure crops must be given to the land. The pupils were not merely told this fact once, but many times. The dullest member of the class can tell what gives the dark color to the soil. The pupils are taught to mix their own fertilizer and thus to reduce the expenses of buying plant food. They are taught to use feeds so as to get the greatest value out of them and what are the comparative values of the different feeding materials. The list of things that are taught is too long to be given in full, but suffice it to say that every recitation or class gives most of them something to think about and brings them some new information about farming.

But how much can the agricultural course given in the public schools do towards causing their pupils to actually put into practice the lessons learned? Of course not everything, but just as assuredly a great deal. We know this fact full well, that there are many poor farmers in the South who are not lazy; they are not successful just because they are following wrong methods. The same energy used by them rightly would make a fertile soil and a good living. Many boys in school today are of just this type. The agricultural schools are going to do much to start them right. No, the agriculture taught in the public schools will not remain all theory, although with many it will largely be that way, better farms and larger yields are sure to result.

Moreover, it has been found that the agricultural schools become centers for agricultural enterprises. The boys' corn and potato clubs thrive better around the agricultural schools than anywhere else. The pupils put into practice principles that they have just learned. And the agricultural teacher often has to go and give advice right in the field—this is putting theory into practice. It is found that the young farmers just beginning and others who have been actively engaged for a number of years, make use of the agricultural teacher and thus extend his usefulness. In some sections at least, the agricultural teacher is kept at his posts through the vacation to help the farmer with his problems and to make a study of local conditions so as to be able to give the more practical instruction. Then the school garden where a few well planned experiments are conducted is useful to both pupils and farmers; in it are demonstrated practices that have been subjects for discussion in the neighborhood for decades.—*In Southern Agriculturist.*

ON GUARD.

For two years the State Board of Entomology has been keeping guard over certain phases of our agricultural interests in making close inspection of all imported nursery material coming into Tennessee. Of course there has been danger of fresh importations of San Jose scale but interest in European shipments of plants has greatly increased by the occasional appearance of Brown-tail moth nests. The Brown-tail moth has appeared in the Eastern states and has with the Gypsy moth been notoriously damaging and expensive and all states not yet visited are very much on guard.

Our State Entomologist, Mr. Bentley, has been out for about two weeks in different parts of the State inspecting foreign shipments and reports occasional nests of Brown-tail larvae.

Importations of pests may be accidently made, but from what is known of the effect of the Gypsy and Brown-tail moths in the East all importations of plants from Europe should only be made when absolutely necessary and then under such rigid restriction that the escape of these pests would be impossible.

It is indeed a grave responsibility placed upon Boards of Entomology and it is gratifying to know that the heartiest co-operation exists among various State Entomologists and the Bureau of Entomology of the U. S. Department of Agriculture, with particular reference to this work. States like New York, possessing large ports, have given great assistance in reporting awards for the State. In this way officials are notified well in advance and are able to take all precautionary measures.

Without an efficient Board of Entomology and alert officials it is quite likely that we should have already been seriously involved.

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EDITORIAL

With this issue the term of office of the present staff is ended. How faithfully they have served, you are left to judge. The year, taken as a whole, has been one of pleasant service and altho not without the difficulties and struggles which most such publications encounter the students have stood by loyally, with the result that our paper is now on a substantial basis with its most trying period over. Much of the success of this year is due Mr. Worthington, our efficient Business Manager, who took charge of the paper when it was overshadowed by a heavy debt but has succeeded in freeing it of all incumbrance, so that the new staff may start out the new year at least without having to face a host of creditors. But it is contrary to human nature to be satisfied with results. Our publication is yet far from the ideal of which our institution is worthy. It is not yet representative enough. If you will but glance through the issues of the past year you will find that but a small percent of the students have contributed anything for publication. So many students fail to attain the degree of enthusiasm which will impel them to sacrifice a part of their pleasures for the sake of worthy student enterprises. There is much more in a college course than attendance upon classes, and making high grades or in striving to become the most popular student at the expense of studies. A student should enter heartily into every legitimate college activity if he desires to graduate with the feeling that he has gotten all that was coming to him. In the U. T. Farmer is offered every agricultural student an opportunity to gain experience of a nature such as is afforded by no other phase of university life. Experience, too, that is invaluable because the great demand of the world to-day is for men who can explain in a logical and interesting manner the problems which are met in everyday life. For due to our rapidly increasing population and in many instances rapid depletion of natural soil fertility the problem of maintaining an adequate food supply assumes the greatest importance.

The new staff is as follows: Jno. F. Farrow, '10, Editor. Judd Brooks, '12, assistant editor. D. C. Parman, '11, Business Manager and C. E. Allred, '12, Assistant Business Manager. These men have proven their abilities as students and with the hearty co-operation of the student body will insure for our paper a year of increasing popularity and prosperity. But let us remember that they accepted their respective offices with the understanding that they were to be accorded our support and let us all work to make the coming year the most prosperous within its history.

PROGRAM

37th ANNUAL MEETING

EAST TENNESSEE FARMERS' CONVENTION AND INSTITUTE

To be held at the
UNIVERSITY OF TENNESSEE
Knoxville, Tennessee

MAY 17, 18 AND 19, 1910

Under the auspices of the
DEPARTMENT OF AGRICULTURE OF TENN.

JOHN THOMPSON, Commissioner.

In addition to the General program there will be five separate sectional programs, devoted, respectively, to the subjects of Live Stock, Dairying, Poultry, Horticulture, and Home-making. The general program will be given in Jefferson Hall at the morning and evening sessions. The sectional programs will be given in different buildings, and each one will occupy the two afternoons. The Home-making section will also have morning sessions. For the hours and places of meeting, see the separate programs.

GENERAL PROGRAM

Jefferson Hall.

FIRST DAY, TUESDAY, MAY 17.

Morning Session, 9:00 o'clock.

1. Call to order by the President, W. R. Reeves, Jonesboro.
2. Opening services. Federation of Churches, Knoxville.

3. Address of welcome. Dr. Brown Ayres, President University of Tennessee.
4. Address, Hon. John Thompson, Commissioner of Agriculture, Nashville.
5. Corn: Varieties, selection, and improvement. Prof. C. A. Mooers, University of Tennessee.
6. Discussion. Led by John A. Jones, Concord.
7. The State Seed Law. Prof. S. M. Bain, University of Tennessee.
8. Appointment of committees, by the President.

Evening Session, 7:30 o'clock

Good Roads.

a. Best means of financing country roads. Hon. John H. Caldwell, Bristol.

b. Construction. W. S. Keller, Office of Public Roads, U. S. Dept. of Agr., Selma, Ala.

SECOND DAY, WEDNESDAY, MAY 18

Morning Session, 9:00 o'clock

1. Opening services. Federation of Churches, Knoxville.
2. Economical maintenance and development of soil fertility. Director Chas. E. Thorne, Ohio Experiment Station, Wooster, Ohio.
3. Discussion.
4. Agricultural education and extension in its relation to the farmer and the public school. Prof. Geo. I. Christie, Purdue University, Lafayette, Ind.
5. Discussion. Prof. R. L. Jones, Superintendent, Dept. of Public Instruction of Tennessee, Nashville.

Hon. John Thompson.

Evening Session, 7:30 o'clock.

1. What the State Department of Agriculture and the Experiment Station may do for poultry in Tennessee. Hon. T. E. Quisenberry, Secretary, Missouri State Poultry Board, Columbia, Mo.
2. Fire waste in Tennessee. A. H. Tipton, Fire Marshal of Tennessee Nashville.

THIRD DAY, THURSDAY, MAY 19.

Morning Session, 9:00 o'clock.

1. Opening services. Federation of Churches, Knoxville.

2. State, district and county fairs as factors in our agricultural development.
   a. The state fair. Hon. A. P. Sandles, Secretary of Agriculture of Ohio, Columbus, Ohio.
   b. The district fair. Frank D. Fuller, Secretary Tri-State Fair and Exposition, Memphis.
   W. J. Oliver, President Appalachian Fair Association, Knoxville.
   c. The county fair. W. J. Webster, Columbia.
3. The Agricultural Short Courses for Farmers. Phil. S. Taylor, President Tennessee Agricultural Short Course Club, Embreeville.

Live Stock Section

Jefferson Hall

FIRST DAY, TUESDAY, MAY 17

Afternoon Session, 1:30 *o'clock.*

1. Live stock in its relation to permanent agriculture in Tennessee, Prof. C. S. Plumb, Ohio State University, Columbus, Ohio.
2. Discussion, Led by Hon. J. H. McDowell, Live Stock Commissioner of Tennessee, Nashville.
3. The farm brood mare, with special reference to mule raising. John L. Jones, Columbia.
4. Discussion. Led by Stokley Susong, Newport.
5. The essentials in lamb production in Tennessee. Geo. Peay, Goodlettsville.
6. Discussion. Led by Percy Brown, Spring Hill.

SECOND DAY, WEDNESDAY, MAY 18

Afternoon Session, 1:30 *o'clock.*

1. Economical feeding of beef cattle.
   a. Winter feeding. Dr. Tait Butler, Starkville, Miss. Discussion. Led by John M. Stokley, Newport.
   b. Feeding on grass. H. B. Clay, Church Hill, A. R. Swann, Oak Grove.
2. Hogs and their commercial managements. J. D. B. DeBow, Nashville.
3. Discussion. Prof. W. B. Mooney, Harriman; J. F. Stanberry, Newport.
4. Essentials in the breeding of live stock for the farm. Prof. C. S. Plumb.

Dairy Section

Basement of Morrill Hall

FIRST DAY, TUESDAY, MAY 17

Afternoon Session, 1:30 *o'clock.*

1. Herd records as a means of making dairying more profitable. Helmer Rabild, Dairy Division, B. A. I., U. S. Dept. of Agr., Washington, D. C.
2. Poultry in connection with dairying. D. W. Duncan, Cleveland.
3. Development of the dairy cow. Prof. C. H. Eckles, University of Missouri, Columbia, Mo.
4. Butter contest.

SECOND DAY, WEDNESDAY, MAY 18

Afternoon Session, 1:30 *o'clock*

1. Production of clean milk.
   a. The farmer's side of it. J. O. Schaad, Jr., Knoxville.
   b. The Board of Health view of it. Dr. M. Jacob, City Dairy Inspector, Knoxville
   c. What the milk plant demands. D. W. Jackson, Knoxville Pure Milk Co., Knoxville. F. B. Stuart, Racy Cream Co., Knoxville.
3. The use and care of farm separators. S. E. Barnes, Field Dairyman, U. S. Dept. of Agr. and Tennessee Exp. Station, Knoxville.
4. The feeding question. Director H. A. Morgan, Tennessee Experiment Station, Knoxville.
5. Feeding the dairy by-products. Discussion. Led by Prof. C. H. Eckles.
6. Judging dairy cows. Demonstration.

Poultry Section

Y. M. C. A. Assembly Room

FIRST DAY, TUESDAY, MAY 17

Afternoon Session, 1:30 *o'clock*

1. The all-purpose hen. Dr. T. J. McKamy, Cleveland.
2. Shall more than one breed be kept in each farm? Prof. T. C. Karns, Powell Station.

3. The best way to dispose of farm poultry—organization. W. J. Fraser, Knoxville.

4. Caponizing. Capt. T. E. McLean, ex-President East Tennessee Poultry Association, Knoxville.

SECOND DAY, WEDNESDAY, MAY 18

Afternoon Session, 1:30 *o'clock*

1. Poultry raising from an educational standpoint. Prof. V. S. Bright, Hickson.

2. Poultry statistics. T. L. Bayne, Russellville.

3. Discussion. Led by N. R. Williams, Jonesboro.

4. Economical equipment for practical poultry raising on the farm.

   a. Land, fences, and crops. J. A. Dinwiddie, New Market.

   b. Incubator and brooder. Robert S. Porter, Knoxville.

5. The relation of the breeder to better farm poultry. Hon. T. E. Quisenberry.

Evening Session, 7:30 *o'clock.*

(See General Program.)

Horticultural Section

First Day, Room 205 *Morrill Hall*

FIRST DAY, TUESDAY, MAY 17

Afternoon Session, 1:30 *o'clock*

(Each address will be followed by general discussion.)

1. Orchard managements. G. Harold Powell, Assistant Pomologist, U. S. Dept. of Agr., Washington, D. C.

2. Orchard spraying. J. D. Ellis, President Tennessee Horticultural Society, Dayton.

3. How I produced 9,000 quarts of strawberries per acre. Charles Coleman, Knoxville.

4. The business aspects of commercial strawberry growing. W. P. Wade, Kenton.

5. The Short Course in Horticulture. Frank McClung, Knoxville.

SECOND DAY, WEDNESDAY, MAY 18

Afternoon Session, 1:30 o'clock

Orchard management. (The meeting will be held at the University Fruit Farm. Various devices for protecting the fruit crop from frost will be shown, and there will be exhibits of spraying apparatus, and a demonstration of spraying. Operations in thinning and systems of tillage will also be illustrated.)

Home-Making Section

First Floor, Carrick Hall

FIRST DAY, TUESDAY, MAY 17

Afternoon Session, 2:00 o'clock

1. Address. Miss Catherine A. Mulligan, University of Tennessee.
2. Need of co-operation among farmers' wives. Mrs. J. A. Reagan, Sweetwater.
3. Discussion
4. Rural school improvement. Miss Virginia B. Moore, Organizer of School Improvement Associations, Nashville.
5. Organizatin.

SECOND DAY, WEDNESDAY, MAY 18

Morning Session, 9:30 o'clock

1. The farm home in saving the boy and the girl for the country. Prof. P. P. Claxton, University of Tennessee.
2. The care of food in the home. Prof. Maurice Mulvania, University of Tennessee.
3. Cooking demonstration.

Afternoon Session, 2:00 o'clock

(Meet with the Dairy or Poultry Section.)

THIRD DAY, THURSDAY, MAY 19

Morning Session 9:30 o'clock

1. Essentials in making good butter on the farm. Mrs. W. V. DeVault, Johnson City.
2. The poultry yard and the farmer's wife. Mrs. W. B. Madden, Knoxville.
3. The home garden. Mrs. James C. Bradford, Nashville.

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THE U. T. FARMER

Vol. IV. MAY, 1910 No. 8

CORN FIELDS OF THE UNIVERSITY STATION FARM.

It will probably be of much interest to many farmers to know of the previous care and preparation of fields or sections IV and VI of the University Station that are to be cultivated in corn this season. For the last few years a double cropping system has been carried on in these fields —the following data has been secured regarding the care of these soils.

Section or field IV is a clay loam, with clay subsoil, and is well supplied with humus. After a large hay crop of wheat and vetch of 2 tons per acre, the field was seeded to 10 lbs. sorghum and one-half bushel peas per acre. The peas and sorghum were sown for ensilage and were cut in September, 1908, producing 11 tons per acre. In October the field was harrowed, dragged, and reharrowed, and sown to a mixture, composed of Sonoma oats, 2 bushels, hairy vetch, 20 lbs., and crimson clover, 15 lbs. per acre. The crop was harvested in May, 1909, and produced 2½ tons of hay per acre. After this crop was removed, the land was plowed and harrowed with disc and 60 tooth harrow then seeded to Mammoth Yellow Soy Beans, 30 lbs. per acre, in 30 inch rows, with Avery double row corn drill. The soy beans were cut, removed from the field and put on cocks the 23rd and 25th of October. The soil was then disced thoroughly with the Cutaway and large single disc harrows, and seeded, on November 1, 1909, to Fulcaster wheat, 1 bushel, crimson clover, 15 lbs., and hairy vetch 15 lbs. per acre, with the Superior grain drill. In January, 1910, the field was top dressed with 12 ordinary loads of barnyard manure per acre. The crop of wheat, when 15 inches high, was plowed under as green manure with walking plow, plus the Avery subsoil plow. The subsoil plow was so arranged that the subsoil was not thrown to the surface but remained in place. This being the case a decrease in yield should not occur on that account. The pulverizer, disc and 60 tooth harrow were used. April 29, an application of 500 lbs. acid phosphate and 75 lbs. sodium nitrate was made. April 30, one acre was seeded to Cock's Prolific Corn, 18 lbs. in 44 inch rows. The remaining three acres were seeded to Haufman's corn, in 44 inch rows.

Section VI, a loam with clay subsoil comprising both bottom and upland soils is well supplied with humus. Following a crop of crimson clover which was turned under in Spring of 1908, the field was seeded to different varieties of corn for ensilage, and produced as follows: Cock's Prolific 16

tons, Albermarle 15 tons, Hickory King and Watson on an average of 11½ tons per acre. In the fall of 1908, a mixture composed of vetch, 30 lbs. and oats, 1½ bu., per acre was seeded to 30 acres and the remaining two acres were seeded one to Culberson's Oats and red clover, the other to Sonoma oats and red clover. June, 1909, the crops were harvested and the fields prepared and seeded to soy beans, mammoth yellow variety. The beans were harvested October 27, yielding 3,360 lbs. hay per acre. The land was then harrowed several times and seeded to barley, 60 lbs. crimson clover, 15 lbs.; and hairy vetch, 15 lbs. per acre. This was sown to be turned as green manure. The crop was turned, excepting one acre left as a check to compare the walking plow with the Spalding Deep Tillage machine. On April 30, the barley was 15 inches high. The walking plow only plows 9 inches deep and does not thoroughly cover the green manure, while the deep tillage machine buries the organic matter about halfway between the surface and subsoil, this being 8 inches below the surface.

What will this deep tillage machine do? It will plow deeper than anything ever before used on the station farm, buries organic matter where it will rot without drying out the soil, leaves a loose layer of soil both above and below the green manure crop, increases water holding capacity of the soil and enables the root system to cover more feeding surface.

With the soil in such a state of fertility, plus the good plowing of the deep tillage machine, a large crop is naturally expected.

The soil of most any farmer can be improved greatly by the addition of green manure, used as a cover crop during winter and plowed under in the spring, and by plowing much more thoroughly than he has heretofore.

—Judd Brook, '12.

HOG RAISING IN THE SOUTH

W. M. Brown.

Our commonwealth today is facing the same crisis in agricultural lines that all of the older countries of Europe have heretofore faced and overcome for the most part. Our farmers have been continually drawing upon their bank accounts of soil fertility until the cashier, the crop, sends back the report that they have almost overdrawn their account. Now, shall we profit by the experience of those European countries whose methods of agriculture are far ahead of our own, and resort to the only plausible course to build up our now depleted soils, and keep our country an exporting instead of an importing nation.

It is useless for me to say that I refer to the live stock industry as our only resort; and in my mind no branch of this industry presents such extraordinary opportunities at the present time as that of raising hogs. In reply to this statement the majority of our farmers will say, "Oh, I

cannot afford to feed corn to hogs when I can get 90 cents and one dollar per bushel." Thus they continue to ignore their soil and think only of the market value of their farm products, whereas they should feed them to hogs or other stock and thereby get their profit out of the finished animals. In this way, the fertility is kept on the farm and the bulk of the products sold come from the air, where there is an inexhaustible supply of these elements used.

The opportunities in this line are proportionate both to the small and large farmer; but it is advisable for any farmer, who has never had any experience with hogs, to begin on a light scale until he learns the business thoroughly. Let us contract two farmers who own 100 acres each of tillable land, supposing all conditions equal. The first farmer grows grain exclusively, which he sells, while the other grows a rotation of crops which he feeds to hogs.

The first farmer will have his farm divided something like this: 40 acres of wheat at average of twelve bushels per acre at one dollar per bushel will be $480.00; 40 acres of corn at 30 bushels per acre, which is above the average at $.75 per bushel, would be $900.00; 20 acres of cotton at one-half bale per acre would be 10 bales at $65.00 per bale this would amount to $650.00, which makes a total of $2,030.00. At least one-third of this amount can be subtracted for the expense of cultivating and harvesting, which would leave a balance of $1,354 approximately.

Now, let us look to the other farmer who starts with 15 brood sows to farrow in March. The sows should bring 100 pigs. The fall before he has sown part of his land to barley and crimson clover, wheat and alsike clover and has a few acres of alfalfa on which these pigs are pastured; following the barley and common clover, sorghum and crimson clover are sown for pasture throughout the summer.

The pasture is supplemented from the first with grain which is held over. At the middle of September the 100 pigs are put in the corn and pea field to finish and go on the market the 1st of November, being eight months old. They should weigh at this time 250 lbs. each.

Making the proper divisions and rotations of the grain and pasture crop, 100 acres will easily produce enough feed for two litters of 100 each year. Taking this as a basis, we have 200 hogs that weigh 250 lbs. each, which, if counted at 6 cents per lb. would bring $3,000.00. Let us count one-third off for expenses here and we have left $2,000.00 as a profit against $1, 350.00 on grain farming.

Now let us make a comparison of the fertility removed by each method. Putting the market value on the plant food removed by the corn it amounts to $552.00; the wheat will remove $206.00 worth of fertility, and counting the fertility sold in the cotton seed at $10.00 per acre we would have $200.00 more to add, which would make a total of $958.00 worth of fertility *sold off the farm* and $1,350.00 gotten in return.

On the other hand, practically no fertility, or a very small amount, is sold away in the finished hogs, while it is claimed by good authorities that the manure left by each hog on the farm is worth $10.00, but we will count one-half of this and see what the result will be: $1,000.00 worth of fertility given back to the soil. Then we see that the farmer who *farms* is making a profit of $2,000.00 a year and building up the land at the same time, while the *miner* makes a profit of $1,350.00, giving him top prices for his grain, and sells off $958.00 worth of fertility from his soil. We therefore see that the former makes $1,600.00 more than the latter.

If the farmers of the old Volunteer State would give this some thought and follow out their convictions, in a few years we would see fertile, unbroken fields where now we see nothing but clayey fields and red-hills, streaked with gulleys.

FARMERS' EDUCATIONAL AND CO-OPERATIVE UNION OF AMERICA.

J. F. Farrow.

The Farmers' Educational and Co-operative Union of America was organized in Texas, about 1903. Low prices in farm products and poor conditions generally were the chief reasons for its existence. Since its origin, it has reached every Southern state, and claims a membership of nearly three million. As its ideals, it holds up education and organization. Continued efforts are made to better the condition of the farmers generally, and to bring about a closer brotherhood. After thus noting briefly the history and purposes of this organization, let us now look into its merits.

We will note first, what might be termed, the disadvantages or obstacles encountered. It is even difficult to effect an organization within a township of 1,000 or less. Some refuse to come in, others join in name only and take no active part, while part remain on the outside as knockers. If this be the case in so small a town with a local undertaking, how much more so will just such conditions exist in an organization of three-million people, scattered over a dozen states. Then, again, the ignorance of the farmer, coupled with his extraordinary suspicions of everything connected with himself, are used as arguments against the practicability of the Union. And finally the very fact that a farmers' organization is ridiculed as being theoretically and entirely impracticable.

Now, shall we hold back from such a work because others stand off and do not take a part; because some one is ready to magnify every mistake made; because some members prove worthless or because success has not always crowned our efforts? No, indeed, these so-called reasons should be an incentive for greater effort. Again, why has the farmer always taken his place in the background? Why has he been compelled to allow some

other person to name the selling price of his products? Why has he paid the merchant, fertilizer man or any one with whom he deals, a certain stipulated price fixed, not by the buyer in this case, but by the seller?

In answering these questions, we would not reflect for an instant on the intelligence of the farmer; yet we must treat the facts as we find them.

First, the farmer has acquiesced in the matter, or if he objected, it was only in a half-hearted manner and really amounted to nothing after all. As long as starvation was not staring him in the face, it mattered not to him what he received or what he paid. But again, why this unnatural condition? We simply answer with one word, ignorance. By ignorance, we do not mean the absence of gray matter on the part of the farmer, but we do mean the lack of an education.

Since the colonization of America, crooks and sharpers have found the farmers an easy mark. In almost every case he has walked into their well-laid traps. The result of all this accounts, in a measure, for the poor conditions existing among the farmers, and it is high time that they were awakening to a realization of their condition as well as the opportunities offered.

This organization movement in Texas in 1903 was only the beginning of such an effort on their part. The strange part about it is that such a movement was not started sooner. A small number of farmers, living in Eastern Texas, realized that they were not receiving high enough prices for their products, especially cotton, and hence organized. 'Tis true that many obstacles confronted them and no doubt they were often tempted to give up and drop back in the same old rut. But characteristic-like of the farmer, when he has once set his head, they resolved to conquer or die in the attempt. The result has been noted and today, wherever we travel in the South, we see the fruits of this movement, started about seven years ago.

And why should not the farmer profit by such a means? Notice, if you will, the organizations of the wheat raisers in the west, the sheep and cattle men of the northwest and coming closer home, that of the tobacco growers in our own State. Success has crowned their labors, though troubles were plentiful in the beginning. Another person inquires if the union is not of itself wrong. If he would study for a moment the constitution of this organization, it would be answer enough to his question.

This union is not out on the warpath, robbing the *innocent* brothers of their ready cash; neither are they trying to create a demand greater than the supply. They simply want justice, something they have never had, but sure to come to them sooner or later. As a last and final argument, the point is made that poorly qualified men often have charge of the union and consequently unable to properly run it. Of course, some leaders in the different localities do make mistakes, and the union is thus made to suffer more or less; but as a remedy for this we suggest that

only true and tried leaders be clothed with such power. We not only believe the farmer capable of running the Farmers' Educational and Co-operative Union of America, but what is more, we consider him capable of running this government.

THE SOIL WORKER.

D. C. Parman.

A new implement has just been put into use at the farm this season. It is known as a "soil worker," and is a deep tillage machine. It is a plow capable of mixing the soils together rather than throwing the subsoil on top. Its greatest advantage is the fact that it will mix the heaviest sort of a cover crop evenly through the soil to the depth of 20 inches.

The subsoils do not pack back in their original condition as when broken with a subsoiler, as the humus is mixed with the clay, thus converting it into a granular condition, as well as forming a deep plant bed for the conservation of water. By the use of this plow it is believed that the deep tillage will not be needed as often as with the common subsoil, and the soil will serve as a better reservoir for the rain-fall.

ALFALFA.

Alfalfa is one of the cheapest and most nutritious forage plants grown. Many farmers say they cannot grow it on their farms. This is a mistake in most cases, as Alfalfa will grow in any part of Tennessee if the right preparation of the soil is made before the crop is planted. A plant with as strong a growth as alfalfa cannot be expected to do well on a hard clay bank. Alfalfa is not a strong feeder, and it may be compared to sorghum as a well bred hog would be to a razor-back. You can keep the razor-back (sorghum) much more cheaply than you can the well-bred (alfalfa) but the profits are much less.

If a field is carefully tilled 14 inches deep, plenty of humus mixed with the soil, and an abundance of lime applied, the average soil of Tennessee will produce alfalfa economically. The humus may be had by turning under a crop of sorghum or peas, which have been well fertilized with barnyard manure or 200 lbs. of acid phosphate and 80 lbs. nitrate of soda.

Alfalfa may be used as a hog pasture and it has been found profitable to grow the pig until finishing time on alfalfa alone, but it is generally considered better to feed some corn or grain containing little protein. Land that will produce 50 bushels of corn, will ordinarily produce 6 tons of alfalfa hay.

Alfalfa has been cut at the farm (May 3rd) and more than one ton per acre harvested. It can be cut every six weeks, until frost, which will give us about five more cuttings. Alfalfa sown last September has already been cut and a fair yield obtained.

DEEP OR SHALLOW CULTIVATION OF CORN.

This is one of the questions that comes up every year, and has, to our personal knowledge, for the last fifty or sixty years. It is a question that can not be answered in such a way as to suit every condition and circumstance. We shall not attempt to answer it; but have used the title simply to give us an opportunity of pointing out the object to be gained by cultivation, whether deep or shallow.

If the land has been well plowed and thoroughly cultivated, and the seed bed well prepared, it is seldom that anything more than shallow cultivation is positively injurious. If anyone will study the root system of corn he will see that by the time it is eighteen inches high the roots fill the entire space between the rows at the point where they can secure moisture, not above that point and not to any great extent below it.

If in the preparation of the seed bed close capillary connection has not been made with the subsoil, or rather the undersoil and soil on top, then we would say that deep cultivation one way before the corn is up would be very desirable. If the plow goes down deep, even if the corn row is covered up, cross harrowing will prevent it from interfering with the upward movement of the corn; and after that cultivation should be made with the one definite idea not of killing weeds but of conserving moisture by the development of a mulch of loose dirt.

Under ideal conditions that is all that is needed; but that dirt mulch must be maintained. The thing that interferes with it most is the rains that come so frequently during the corn cultivating season. The rain runs the loose surface soil together, particularly if it is deficient in vegetable matter. A crust is formed, which promotes evaporation of the water that may be needed for the corn crop, and this must be broken up. Deep cultivation is not necessary to accomplish this. Frequently the weeder will do the business, or the harrow, and shallow cultivation will always do it.

Sometimes the seed bed has not been properly prepared, however. Weeds have not been killed in the dew of their youth by the weeder or harrow or shallow cultivation. The weeds become deep rooted. After the weeds have become deep rooted the weeder will do them no harm, and the cultivation must be deep enough to bury the weeds, no matter what happens to the corn roots.

In short, the whole idea in cultivating corn is, first, to prepare a seed bed, firm at the bottom, loose at the top, and then to maintain that condition, incidentally killing the weeds. It is perfect folly for a man to allow his cornfield to become weedy or cloddy, if it can possibly be avoided. These weeds must be kept down and the cultivation must go deep enough to kill them but more than that is unnecessary, especially after the corn is eighteen inches high and the root system covers the entire space between the rows. This is about all that can be said upon the subject. —Wallace's Farmer.

COWPEA WHEAT ROTATION.

For four years some 20 experimental plots have been devoted to the study of the effects of cowpeas on the succeeding crop of wheat. In this series both cowpeas and wheat have been grown each year, under various conditions, such as with and without fertilizer including lime, peas turned under and peas removed, in conjunction with various combinations of liming and phosphating. The soil was a fertile loam in excellent mechanical condition. The results, from 1905 to 1909, so far as the effect of the cowpeas are concerned, are briefly as follows:

1 Peas turned under have not maintained the yield of wheat; that is, the yield has decreased since the first year.

2. Peas removed have reduced the yield of wheat about 7 bushels per acre, on the average of the four years as compared with the yields where the peas were turned under (no fertilizer in either case.)

3. With the same fertilizer in each case (200 pounds acid phosphate and 50 pounds of muriate of potash per acre applied previous to planting the cowpeas) the average yields of wheat have been as follows:

	(4 year average) Bu. per acre
1. No cowpeas	28.7
2. Cowpeas removed	22.5
3. Cowpeas turned under	29.1

The results for 1909 on these plots are especially interesting and are as follows:

	Bu. per acre.
1. No cowpeas	22.5
2. Cowpeas removed	17.5
3. Cowpeas turned under	25.9

It is evident, from the foregoing results, that on this particular field the growing of cowpeas as a green manure crop has not been profitable, but the yield for 1909 indicates that it may be profitable in the course of time.

Similar experiments have been conducted for three years in one instance and for two years in several others on much poorer soils than that at the station farm. In some instances the effect of the cowpeas in improving the mechanical condition of the soils has been marked and increased yields of wheat follow, even when the peas are removed. We have no evidence, however, that this method if continued, would result in a permanent increase in productiveness. On the contrary, there are both the best of theoretical reasons and experimental evidence to show that a system of cropping, such as this, where the cowpeas are removed for hay and followed with wheat, no manure being put on the land, is much more exhaustive of the plant-food supplies of all kinds, than where wheat alone is grown continuously. A leguminous crop, such as cowpeas, if removed from the land, takes away large amounts of the mineral elements of plant food, phosphoric acid, potash and lime.

In regard to nitrogen, even if we assume that all the nitrogen left in the roots, stubble and fallen leaves be gathered from the air (which certainly is not the case under average conditions), the amount so obtained is small and would furnish sufficient available nitrogen for only four or five bushels of wheat per ton of hay removed. —C. A. Mooers.

———::———

The above by Prof. Mooers covers only the four years from 1905 to 1909, but does not summarize the effects of the cowpeas on the wheat crop of 1910. After looking carefully over the plots several times, we have come to the following conclusions regarding some of the experiments:

The five ranges beginning with F and ending with J each contain five plots, numbered four to eight, inclusive. These twenty-five plots present a very heterogenous appearance at this writing, due entirely to the treatment received for the past five years. The two plots, each numbered 4 of Ranges F and G, show the effects of turning under cowpeas as against removing them. Both plots had 200 lbs. acid phosphate per acre and in each case one-half of the plot was limed, the only difference being the turning under or removal of the peas. On plot where peas were turned under, we find the wheat in full bloom, 3 ft. 3 in. high and very rich in color, while the plot, where peas had been removed, showed a growth not nearly so green, with the heads in the boot stage and an average height of only 2 ft. 9 in. In both plots the limed half showed up much better. Plots 5 of these two ranges show the effects of turning under or removing the cowpeas on land treated with 200 lbs. acid phosphate and 50 lbs. nitrate of potash. Again, everything is in favor of turning under the cowpeas, as well as liming the soil. Plots 6 were treated with 6 tons of manure and in both cases the cowpeas were removed, the only difference being 50 lbs. muriate of potash added to the plot of range G. This latter plot was at a much later stage of maturity, but was barely better than the other, while both showed the advantage of liming. Plots 7 were not considered, as they have not always been in the rotation. Plots 8 had both been fertilized with rock phosphate, equivalent to 600 lbs. acid phosphate and 50 lbs. muriate of potash, and the only difference was the turning under or removal of peas. In this case we found the plot with peas turned under, about one foot higher than the other, with better heads and foliage all around. The lime did not show in either plot, a pretty good proof that lime was applied with the rock phosphate.

The two plots numbered 4 of Ranges H and I, were left untreated, the disposal of the pea crop being the only difference. Perhaps the most marked difference of any two plots was found here. The plot, where peas had been turned under, showed a growth of over 3 feet, while the other hardly reached 2 feet. The latter looked bad, and no doubt would not yield one-half as much wheat as the other plot.

Plots 5 of ranges J and I were treated somewhat differently, the plot on J receiving rock phosphate 3,000 lbs. and 50 lbs. of muriate of potash, while

the other plot was treated with 3,000 lbs. acid phosphate per acre, and 50 lbs. muriate of potash. The phosphate fertilizers were all applied at beginning of experiment and the plots have received none since. The amount of potash was supplied each year, and peas were turned under in each case. We find the acid phosphate plot showing up some better than the plot treated with rock phosphate, but the difference is hardly enough to justify the extra price of the acid phosphate.

Plot 4 of range J was treated to 3,000 lbs. bone meal, and peas turned under. Half of the plot was limed, and this showed up much better than the unlimed portion. The plot was very fine and as good as any in the experiment. Plots 6 of ranges H and I were treated with bone meal and Thomas slag respectively the equivalent of 200 lbs. acid phosphate being used in each case. Peas were turned under in both and half of plots treated with lime. The plots now seem very similar and the wheat looks good on both.

One other plot, 5 on range H, had no peas in 1909, but was treated with 200 lbs. acid phosphate and 50 lbs. muriate of potash. The land was left fallow during summer of 1909. The wheat averages only about 3 feet in height, is somewhat yellow, and is not near so good as the plot where no fertilizer was used, but peas turned under.

THE FARMERS' CONVENTION

The Farmers' Convention for East Tennessee meets at the University May 17, 18 and 19, 1910. These conventions in the past have always proven

FARMERS' CONVENTION DELEGATES VISITING THE EXPERIMENT STA. FARM.

of incalculable benefit to the farmers who attended them. It is the one place where all phases of agriculture are discussed, and every farmer, no matter what his type of farming, is able to find just what he needs most. Every department is represented on the program by the strongest men in that particular line, and no one can afford to miss any part of it. The agricultural faculty, realizing the vital importance of this convention, have deemed it wise to discontinue the agricultural classes, with the distinct understanding that the students become regular attendants at the convention. The students have always shown the farmers every courtesy while here and they in return, have gone home, boosting the course and speaking words of commendation for the agricultural set. Let us this year make every farmer feel that he is at home with us; that we are really glad to have him here, and when the time comes for him to leave, may he go away with a feeling of gladness for having spent such a short time at our University.

SOY BEAN COOKERY.

As the price of meat continues to go higher and higher the demand for a satisfactory substitute for the tissue building food is becoming more insistent.

The Home Economics Department of the University has recently experimented with the beans and the meal and has found that very attractive dishes can be prepared from them.

The meal contains 20% of fat, so it needs very little fat in the dough nor is butter necessary in the eating of the bread.

There is 38% of protein-tissue food, so one can readily see how concentrated a food this is for no meat, our chief source of protein contains more than 25% of this tissue building element.

Muffins.

1½ cup soy bean meal	1½ cups buttermilk
½ cup flour	½ to 1 teaspoon soda
1 teaspoon salt	1 egg.

Beat the egg, add the salt, milk and after sifting the meal and flour together, stir them into the liquid. Dissolve the soda in two tablespoonfuls of water and pour enough into the batter to make the mixture bubble. Put into hissing hot greased muffin rings and bake.

Boston Brown Bread.

1 cup flour	½ teaspoon salt
1 cup soy bean meal	½ cup molasses
1 cup buttermilk	¼ cup raisins

Scald and seed the raisins. Sift the dry ingredients together. Add to them the liquid and raisins. Put into well buttered baking powder cans, cover and steam for three hours. Fill the molds only two-thirds full.

EDITORAL.

The U. T. FARMER is once more in new hands. The new staff takes charge with this issue and hopes to continue through the ensuing year. The staff of 1909 and 1910 have just retired. As to how they have acquitted themselves while in office, no one is better able to understand and appreciate than the incoming staff.

To use plain English, the spring of '09 found the U. T. FARMER in the hole. There was nothing at all about the financial side of the business to attract any one, and yet these men were willing to take charge and assume the responsibilities; and now for a contrast.

The spring of '10 finds the U. T. FARMER clear of debt, with money in the treasury and her sails flying at full mast. What more could we expect? We feel and know that this prosperity is in a large part due to the student body; it is they who have responded so nobly when called upon; they who have hustled about during the previous summer for new subscribers and more ads, and who have never missed an opportunity to boost the U. T. FARMER, or hold up the hands of those connected with it. However important must have been the students' aid to the success of our little paper, yet we cannot but feel that the major part of our success is due to the combined efforts of the retiring staff. It is they who have taken charge under the most trying circumstances, when failure and not success seemed inevitable. But thanks to them, they have stood at the helm, they have steered clear of the breakers, and have brought the old ship of state safely into the harbor. Their reward must be the satisfaction of knowing that they have done their duty.

And now let us look into the future for a moment, for the U. T. FARMER certainly has a future. Dared we to prophesy, we would tell you of the growth of our paper; how it had come to voice the Agricultural sentiments of its University, and how it had reached out and brought into our department agricultural students from all parts of Tennessee and such will be the case if the students stand with us. As has been said, it is the manner in which they support us, that determines largely the success or failure of our paper.

Let every student for the year '10 and '11 feel that the U. T. FARMER is his paper, and that he belongs to it. He must know that the paper reflects his sentiments, good or bad, whichever they may be, and that it is impossible to get anything out of it, unless something is put in. We feel confident that the agricultural students of the University of Tennessee will rally around the cause and make our paper equal, if not superior to any publication of any State University.

Newcomer's Big Dep't Store
in the heart of Knoxville

EAST TENNESSEE FARMER'S CONVENTION AND INSTITUTE.

PROGRAM.

Jefferson Hall.

First Day, Tuesday, May 17.

Morning Session, 9:00 *o'clock.*

1. Call to order by the President, W. R. Reeves, Jonesboro.
2. Opening services. Federation of Churches, Knoxville.
3. Address of welcome. Dr. Brown Ayres, President University of Tennessee.
4. Address, Hon. John Thompson, Commissioner of Agriculture, Nashville.
5. Corn: Varieties, selection, and improvement. Prof. C. A. Mooers. University of Tennessee.
6. Discussion. Led by John A. Jones, Concord.
7. The State Seed Law. Prof. S. M. Bain, University of Tennessee.
8. Appointment of committees, by the President.

Evening Session, 7:30 *o'clock.*

Good Roads.

a. Best means of financing country roads. Hon. John H. Caldwell, Bristol.

b. Construction. W. S. Keller, Office of Public Roads, U. S. Dept. of Agr., Selma, Ala.

Second Day, Wednesday, May 18.

Morning Session, 9:00 *o'clock.*

1. Opening services. Federation of Churches, Knoxville.
2. Economical maintenance and development of soil fertility. Director Chas. E. Thorne, Ohio Experiment Station, Wooster, Ohio.
3. Discussion.
4. Agricultural education and extension in its relation to the farmer and the public school. Prof. Geo. I. Christie, Purdue University, Lafayette, Ind.

Newcomer's---The Big Store
Where all the cars stop

Newcomer's Big Dep't Store
42 Stores under one roof

5. Discussion. Prof. R. L. Jones, Superintendent, Dept. of Public Instruction of Tennessee, Nashville.

Hon. John Thompson.

Evening Session, 7:30 *o'clock.*

1. What the State Department of Agriculture and the Experiment Station may do for poultry in Tennessee. Hon. T. E. Quisenberry, Secretary, Missouri State Poultry Board, Columbia, Mo.
2. Fire Waste in Tennessee. A. H. Tipton, Fire Marshal of Tennessee, Nashville.

Third Day, Thursday, May 19.
Morning Session, 9:00 *o'clock.*

1. Opening services. Federation of Churches, Knoxville.
2. State, district and county fairs as factors in our agricultural development.
   a. The state fair. Hon. A. P. Sandles, Secretary of Agriculture of Ohio, Columbus, Ohio.
   b. The district fair. Frank D. Fuller, Secretary Tri-State Fair and Exposition, Memphis.
   W. J. Oliver, President Appalachian Fair Association, Knoxville.
   c. The county fair. W. J. Webster, Columbia.
3. The Agricultural Short Courses for Farmers. Phil. S. Taylor, President Tennessee Agricultural Short Course Club, Embreeville.

SPECIAL SESSIONS.

May 17 and 18.
1:30 *o'clock.*

Live Stock, Jefferson Hall.

Dairy Section, Basement Morrill Hall.

Poultry Section, Y. M. C. A. Assembly Room.

Horticultural Section, first day, Room 205 Morrill Hall. Second day at Fruit Farm. Take Lonsdale car.

Home-making Section. First Floor Carrick Hall. First day, 2:00 o'clock, p. m., Second day, 9:30 a. m. and 2:00 p. m., Third day, 9:30 a. m.

Newcomer's---The Big Store
Finest Candy Store and Fountain in the South

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George W. Callahan

To George W. Callahan,
Proprietor of Valley View Farms,
Knoxville, (Dante,) Tennessee.

It is fortunate for agriculture when men who have gained a competence in business determine to return to their childhood homes, and there make Model Farms. Business methods and business management are the great needs of the average farm today. The characteristics that have won success for Mr. Callahan in railway construction, will make of Valley View an object lesson for all farmers.

THE U. T. FARMER

Vol. IV. JUNE, 1910 No. 9

VALLEY VIEW FARMS,

A Symposium by Seniors.

An increasing number of business men whose boyhood was passed on farms, are engaging in practical agriculture. Almost always the large operations of active business life have accustomed them to bring systematic methods to their farming. They work in the large, and they conduct their farms, as they conduct their other enterprises, first giving attention to the purchase and equipment of the plant, then increasing its efficiency, and finally finding not only recreation and health and profit in their farming operations, but the crowning satisfaction of a successful career.

Such a business farmer is Mr. George W. Callahan, owner of Valley View farms. His present holdings comprise 1000 acres or ridge and low lands at Dante, Knox county. There is a pretty sentiment behind Mr. Callahan's farming. In 1867 Mr. Jas. F. Callahan, a Marylander by birth and a Pennsylvanian by rearing, came to Tennessee with his family and bought 140 acres of land in Hines Valley, living there until his death. Among his children was George W. The Senior Callahan was of Irish descent and he married a Pennsylvania German wife. The son has inherited the traditional Irish keenness and the traditional German thrift and industry, and in his business of railway construction he has achieved a marked degree of success. Like his father, he went to Pennsylvania for his wife, and the spacious home on Valley Farms gives ample evidence of the domestic accomplishments of the lady of the manor.

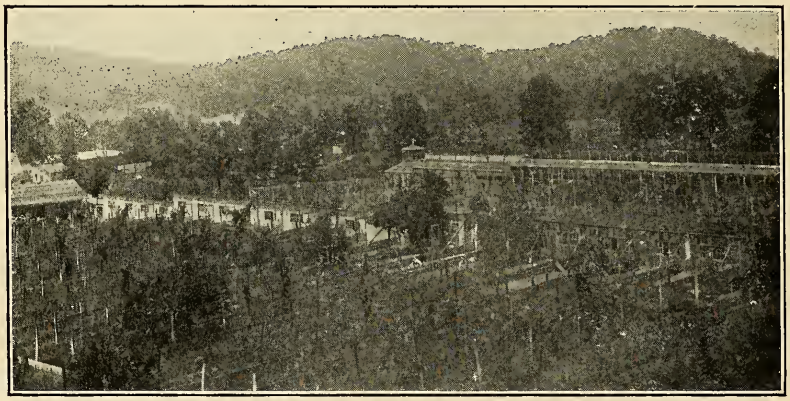
After the death of his father, Mr. Callahan bought the interests of the other heirs in the old farm, and determined to make it his home. He moved to the farm in 1896, and has been gradually increasing its acreage by the purchase of adjoining property, until the estate comprises 1000 acres. Its name fitly describes its general topography, an irregular valley formed by the confluence of three creeks which are separated by low ridges, the whole surrounded by higher ridges which define its general outline.

The residence is a large house of Colonial design suggestive of comfort and home cheer rather than display. It stands in well kept ornamental grounds about ten acres in extent, commanding broad views of field and meadow. Under the dining room windows is a formal garden of old fashioned flowers, and near at hand are ample greenhouses leading into an extensive garden of vegetables and small fruits. To the rear are the heating

and lighting plants, servants' quarters, ice house and carriage house. The residence and green houses are heated from the same plant, which also supplies steam for generating electricity for the entire farm.

A large ram forces water from one of the numerous springs on the place into a reservoir which is located on a hill above the residence, from which it is piped to all parts of the farm when needed.

The lay-out of Valley View farms shows careful study. Traversed by ridges, the property contains much sloping land, while its three creeks are bordered with level bottoms of irregular area and extent. These bottom lands are natural meadows, while the sloping uplands have a tendency to wash. At the time of purchase many of the fields were so gullied as to seem almost beyond redemption. In laying out the fields topographical conditions determined their boundaries. The fences are generally placed near the ridge crests. The fields vary from 25 to 50 acres in area. 23 miles of Page woven wire fence has been used on the place, and there is an accurate map in the office, showing all fields, roads and woodlands, and locating all



fences and gates. As land has been bought the houses thereon have been retained as tenant homes, there being 20 such homes now on the farm.

While Mr. Callahan lives on his estate, his business is in the city. But his intense love of the farm has led him to keep the management entirely in his own hands. He has established five departments: gardening, farm crops, dairying, orchard and poultry, with a working foreman and laborers for each.

The foremen fulfill the definition of that word—they lead, while doing as much work as their men. Everywhere at Valley View is evidence of continuous industry, guided by one master mind.

The garden covers 17 acres of land, devoted to small fruit, grape and vegetable culture. While its primary purpose is to supply the household, all surplus products find a ready market in Knoxville. The extensive range

of green-houses has both private and commercial aspects, carnations, chrysanthemums, roses and violets being the money crops.

The orchard work is the only department not under the direct care of the owner, he having contracted with Mr. Wm. Jenkins of Knoxville for its entire management during an extended period. The orchards contain over 10,000 trees of peach, plum, cherry, apple and pear.

Valley View is essentially a grass farm. At its best Hines Valley was not a fertile region, the soil being a shaly clay; and it had been occupied largely by small farmers, whose careless methods had depleted the fertility of the soil to a discouraging degree. Manifestly the first work on the estate has been to build up the soil, and lime, grass and dairy cattle are the agencies employed.

Farm Crops.

The department of farm crops is under the direct supervision of Mr. Kidd who is peculiarly suited to the handling of it.

Let him take us over what was once a gullied, worn out tract but now is just becoming a magnificent estate, well kept with regard to fences, plantings, buildings, etc., and very pleasing to the eye in every respect. We will not see a level grain farm such as are seen in the natural fertile level lands but a splendid stock and hay farm; one that is rewarding its proprietor with dollars and cents in return for kind treatment.

Now turn to how this is being done and we will find in use a seven year rotation that does not impoverish the soil.

Corn	1910
Wheat	1911
Grass	1912
Grass	1913
Grass	1914
Grass	1915
Corn	1916

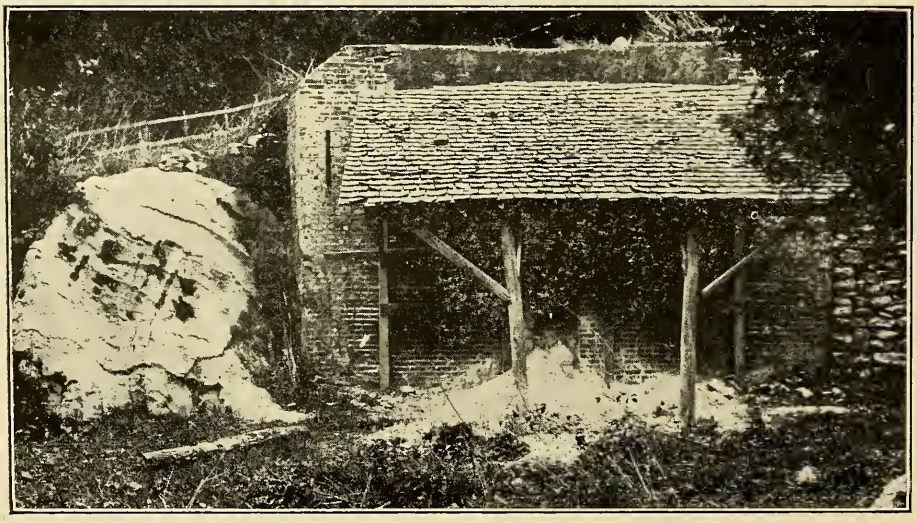
The rotation begins with corn planted in the spring and limed at the rate of 100 bushels of unslacked lime per acre. This lime is distributed over the field in piles about 25-40 ft. apart and allowed to slack, after which it is scattered with a shovel. In some instances the lime is allowed to become slacked and is applied with a manure spreader.

Wheat follows corn in the rotation and the manure is applied at the

rate 5-6 load per acre as a top dressing in winter. It is never applied in the fall and plowed under. This is very beneficial to the wheat which is at this season of the year undergoing a hard strife for life and it also helps the grass which is sown in the spring and becomes the next and most important part of the rotation. This grass is kept as hay meadow 2 to 3 years, and then pastured 2 to 3 years. In other words it is left to grass for 5 years

This makes a very fine seven year rotation in which the ground is only broken twice. All the land is subsoiled at each plowing. This subsoiling is very beneficial in several ways. It prevents the washing of the land which is exceedingly rolling and hence easily washed.

The compactness in arrangement and management and also the self supporting principles that are involved in the production of everything that is used on the farm are only features that show the business methods of its proprietor which are no less illustrated by the burning of his own lime in his own quarry with the use of his own farm labor. This in itself must



be a money saving principle for it only costs him the investment in the kiln, which is a permanent improvement on the farm, and the cost of the labor and fuel used in quarrying and burning the rock.

The kiln is located on a hillside convenient to the quarry which is higher up on the hill. Its dimensions are 14 by 18 ft. and its capacity is 1000 bushels. It is constructed of brick with grate bars about 2 ft. from the ground. The limestone rock is placed on these bars 18 in. deep with spaces between and on this is placed a layer of coal 6 in. deep.

Rock and coal alternate in this way to the top and it is covered over with dirt. A wood fire is kindled underneath and it burns 6 to 7 days, but requires about two weeks to cool. Only slight attention is necessary during the burning process.

An important feature of the farm that illustrates what can be done with completely gullied, very thin, and worn out hill land, is a 20 acre field of blue grass. It bears the marks of gullies yet although they have been filled and leveled. The soil is dolomite and was sowed to wheat last year and limed at time of sowing at rate of 100 bushels per acre.

One hundred and fifty loads of manure were applied in the winter as a top dressing and 24 bushels of blue grass were sown in the spring on the entire twenty acres. The result is a stand of blue grass that is very fine better than is often gotten on much more fertile soil. The yield of the wheat was light but no one would expect anything from this kind of soil. Every farmer should take note of these results for such fields are universal in all farming sections and their value and also their returns to the owner as pasture land are substantial and profitable if they are put to blue grass, to say nothing of the improved appearance they give the farm.

We also realize what can be accomplished by use of tile drains when we see a marsh of several acres made dry enough to drive over in a buggy during the very wettest season of the year and just after a hard rain. This

meadow consists of red top, timothy and clover and although it contains some weeds it is giving profitable returns to the owner. The tile are laid about 2 ft. in the ground in drains 100 feet apart and they lead into a surface ditch.

That this is a combined stock and hay farm is perhaps already understood from its description. Only 75 to 80 acres are devoted to wheat and oats, 25 acres of corn, hay and grass covering the larger area of tilled land. The method of handling the hay is another notable feature. Five hay sheds located on various sections of the farm in the principle hay fields make the handling much easier and also prevent weathering. These sheds are 75 by 24 feet and about 20 feet high; cheaply, but permanently constructed and equipped with hay carriers which make the unloading much more simple than the old process of using a fork. Some of these sheds are weather boarded up the sides and one end making them better but of course more expensive. The hay is stored loose, and is bailed during bad

weather or at convenient seasons. The working force is astonishingly small compared to other farms of this size.

This is due to the fact that it is a stock and hay farm. In the department of farm work the foreman only uses two regular hands. Of course more labor is nescessary in the busy seasons, for instance during hay harvest. Only 10 head of work stock are used in doing the work of the entire farm. This labor saving method employed is another money making principle that adds considerably to the profits of the farm.

Dairy Department.

The dairy herd contains at present 35 cows and heifers. These are all registered Jerseys of great producing strains and while as yet the dairy department has not been perfected, plans are being arranged by which an excellent herd is to be built up. A dairy barn up-to-date in every respect is to be built and all modern dairy conveniences are to be installed. The cream separator and Babcock tester are already in use and their evidence there is to be a continuous elimination of the poor animals. All of the heifer calves dropped are kept until they have been given a chance to make the herd, if they are not promising they are disposed of. The record keeping system of the production and cost of feeding the individual animals is not complete yet but is to be used as soon as plans can be perfected. The entire output of the herd is delivered at present daily to the Knoxville Pure Milk Co. The cows now have the run of 50 acres of pasture and besides are being fed bran and other concentrates in addition to quantities of different kinds of hay produced on the farm. The herd is headed by Mona's Gay Lad.

Poultry Department.

The poultry plant is almost ideally situated, within a stone's throw of the railroad station, on well drained loamy soil.

Eighteen breeds of chickens are kept, the five best being White Leghorns, White and Black Langshans, White Wyandottes, and Partridge Wyandotte, though not necessarily in the order named. In fact, Mr. Austin, the foreman of this department, says that there are no special favorites, though last year the Black Langshan sold best, while this year the Wyandottes have so far led the breeds.

Besides chickens, there are several breeds of pheasants and ducks.

There are three main houses, each having from 20 to 30 runs for the chickens. The houses range from 50 to 75 yards in length and are about 10 yards in width. Running the entire length of each building is a center aisle, and on each side of this we find from 15 to 20 separate pens. These pens have each a double window, with doors entering the runs on the outside. The nests are so arranged near the center aisle, that the eggs may be gotten out without entering the pen. The watering vessels are stationary and furnish water only as the chickens need it.

The runs extend out from the pens for a distance of 30 yards or more, and are enclosed by close woven wire fences. There are gates connecting the runs, so that all the apartments may be reached with the greatest convenience.

Rape is sown in these runs for grazing. In the summer the grown chickens are fed a ration consisting of cut clover hay, bran, shorts, corn meal and linseed meal. At this time they are only fed about four or five times a week, but much oftener in winter. Rolled oats, millet seed, etc., are fed to the young chickens. The eggs are hatched in the incubator, the Johnson hot water type, and the chickens are immediately placed with a mother hen. Eighteen chickens are, as a rule, given to one hen. This system has been found more profitable than the brooder system. Mr. Austin estimates that 80 per cent of the chickens hatched reach maturity, the greatest loss being from the disease known as diarrhoea.

The pheasants are sold over the country in pairs at prices ranging from $15 to $100. The chickens are also sold in pairs at $5 and upwards. Eggs are sold for $2.50 a setting. Nothing but thoroughbreds are sold and the trade extends over the entire country, even selling birds in Central and South American. All birds below certain standard are sent to market—only high class birds being sold for breeding purposes.

Since Feb. 1, 1908, two hundred premiums have been won at poultry shows by Valley view.

A GREAT COW.

Belle Baronetti 163613 is now at the University farm. This cow, belonging to W. Gettys, of Athens, Tenn., was brought to the station last July. Since that time, she has been under test and has indeed made a remarkable record. She will easily go into the advanced registry. She is out of same dam as the famous St. Louis test cow, Baronetti of Ingleside. This is a great cow, and is one of the many proofs that Tennessee is a dairy state and capable of producing the very best cows.

GENERAL PROGRAM FARMERS CONVENTION

Several welcoming addresses marked the beginning of the 37th Annual Convention of the Farmers of East Tennessee. Then followed a discussion of varieties, selection and improvement of corn, by Prof. C. A. Moores and Mr. Jno. A. Jones. Next in order was the seed law which was very ably presented by Prof. S. M. Bain, who pointed out the disadvantages that would occur were the laws rigidly enforced in the first year of its administration. The Convention was divided into five sections: Horticulture, Poultry, Live Stock, Dairy and Home Making. These sections met in different buildings during the afternoons, but all assembled together for the general morning and evening sessions. At the first evening session, Mr. Jno. H. Caldwell read a very interesting paper on financing country roads, followed by Mr. Keller on construction of good roads. They pointed out to the farmers the benefit to be derived from good roads, how they had been successful in various counties, and the different ways by which road bonds could be issued.

At the second general session, Prof. Chas. E. Thorne, Director of Ohio Experiment Station, discussed the economical maintenance and development of soil fertility. He told how the old settlers had acquired new land, robbed it of its virgin fertility and moved on to other hunting grounds. This he said had been practiced in most of the Eastern States and he could easily remember when his father moved to Ohio and took charge of a very fertile farm in the Southern part of the State. The inevitable results followed and the question foremost in the minds of the farmer now is to get the best results and still keep the farm fertile He then discussed the rotation system, dwelling principally on facts found at the Ohio Station, where corn, oats, and wheat have each been grown both continuously, and in a 5 year ration of corn, oats, wheat, clover, and timothy since 1894. It was found that during the first five years there was comparatively little difference between the yields under continuous culture and those under rotative cropping, but that since that period there has been a wide divergence between the yields obtained under the two methods, those on the unfertilized land steadily diminishing under continuous culture, while remaining stationary or increasing under rotation. In the case of the manured or fertilized land the corn and wheat yields continue to fall off under continuous culture, though increasing rapidly under rotation. The yields of oats show a small increase on the manured and fertilized land under continuous culture, but a much larger increase under rotation. The outcome of the test is shown in the following table:

Continuous Compared With Rotative Cropping

Crop	Treatment	Cropping	Period and bushels per acre		
			First 5 years	Second 5 years	Third 5 years
Corn	None	Continuous	26.1	18.4	10.4
	None	Rotative	31.9	30.8	31.0
	Manure, 5 tons per acre	Continuous	36.4	29.2	23.8
	Manure, 4 tons per acre	Rotative	38.9	43.1	50.3
	Fertilizer, 420 lbs. per acre	Continuous	44.6	47.2	38.5
	Fertilizer, 320 lbs. per acre	Rotative	41.3	49.9	54.1
Oats	None	Continuous	28.2	21.3	21.9
	None	Rotative	30.9	28.3	34.5
	Manure, 5 tons per acre	Continuous	30.8	28.5	35.0
	Manure on preceding corn crop	Rotative	32.4	36 4	42.0
	Fertilizer, 420 lbs. per acre	Continuous	42.2	40.1	45.4
	Fertilizer, 320 lbs. per acre	Rotative	43.6	52.5	53.5
Wheat	None	Continuous	10.1	8.4	6.2
	None	Rotative	9.3	8.5	13.6
	Manure, 5 tons per acre	Continuous	13.3	14.3	12.2
	Manure, 4 tons per acre	Rotative	11.5	14.7	24.5
	Fertilizer, 420 lbs. per acre	Continuous	19.8	21.9	17.4
	Fertilizer, 320 lbs. per acre	Rotative	20.5	27.5	31.1

At the Ohio Station there was also carried on an experiment to show the effect of lime on an acid soil, where corn and clover were grown. The following table shows the data obtained:

Effect of Lime on Acid Soil

Fertilizers	Corn bu. per acre			Clover lbs. per acre		
	No lime	Limed	Gain for lime	No lime	Limed	Gain for lime
Unfertilized	29.8	39.8	10.0	1,406	2,204	798
Acid Phosphate	41.5	51.5	10.0	1,649	2,916	1,267
Acid Phosphate, Muriate of Potash	44.2	56.7	12.5	1,892	3,494	1,602
Acid Phosphate, Muriate of Potash, Nitrate of Soda	53.5	61.0	7.5	2,856	3,840	984
Acid Phosphate, Muriate of Potash, Sulphate of Ammonia	48.3	63.6	15.3	1,701	3,724	2,023
Yard Manure	54.3	64.2	9.9	3,339	4,925	1,586

The results of these experiments are known throughout the entire country and have furnished a valuable addition to our store of knowledge regarding the maintenance of soil fertility. It is hard to imagine figures any fuller or more conclusive than those shown by Director Thorne. He concluded his speech with a scientific treatise of how to build up the farms, best rotations to practice, application of fertilizers, and proper care of the soils, and closed by answering any question the farmers cared to ask.

The next speaker was Prof. Geo. I. Christie, on agricultural education

and extension in its relation to the farmer and the public school. Prof. Christie first told of the system in his own state, Indiana, and how courses for the farmers had been arranged; that corn trains had gone over the state and that 12,000 farmers had been reached by one week's short course in testing seed corn. Indiana's yield of corn last year was 40 bushels per acre—5 bushels more than year before, and Mr. Christie naturally attributes this increase to the instruction obtained through this new system of educating the farmers. The question of keeping the boy on the farm was next taken up. He ridiculed the idea of holding him there by means of the beautiful stories of farm life, and insisted that the only way was to convince the boy that it paid him to stay on the farm rather than take up a commercial life. Prof. Christie told of the poor methods of teaching agriculture in the rural schools; that there was nothing practical about the system and that it would be much better to have the children work out common every day problems, rather than follow some text book, written by a fellow who had probably never seen a farm.

In a brief but very pleasing talk on the economic side of life, Prof. R. L. Jones brought the discussion to a close.

At the Thursday morning session, the state, county and district fairs were discussed by Mr. A. P. Sandles, of Ohio. His affable manner and witty remarks captured the crowd.

The district fair was next discussed by Mr. Frank D. Fuller, Memphis; and this followed by W. J. Oliver, on the Appalachian Exposition.

The last speech of the Convention was made by one of our East Tennessee boys, Phil. S. Taylor, President of the University of Tennessee Agricultural Short Course Club. This Club, with its possibilities and opportunities, was the text of Mr. Taylor's remarks. He painted in glowing terms the benefits to be derived from attendance at the winter short course. In the course of his speech, Mr. Taylor referred to our Agricultural faculty, and was very profuse in his praises of their work and efforts to help the farmer. Before closing he again emphasized the value of the short course and urged the fathers present to send their boys to take the work next winter.

The resolutions of the Convention were presented and adopted, the reports of all committees handed in, and the annual report of the Secretary made, which showed the Institute with a bank fund of over $3,000. The meeting then adjourned and another Convention had ended.

Live Stock Section

Prof. C. S. Plumb, Ohio State University, spoke on "Live Stock in Relation to Permanent Agriculture in Tennessee." He began by citing several agricultural states, Illinois among them, where live stock has

decreased within recent years, and grain farming taking its place. The result has been that the supply has failed to equal the demand, and the wail of high prices is heard on every hand. The opening up of new lands in the West is in a measure the cause of this decrease, as grain farming naturally succeeds for the first few years on such farms. Prof. Plumb proposes to answer the question at to the bearing of this depreciation in the number of animals on the future of agriculture. The cropping systems were discussed, and the following statistics were given in regard to the fertility removed by the corn, wheat and oat crops in Tennessee during 1899:

	No. acres grown	Total yield bushels	Av. yield per acre	Total production in pounds of Nitrogen	Phos. Acid	Potash	Total value
Oats ..	235,313	2,725,330	11.6	1,796,538	715,127	540,706	332,272
Corn ..	3,374,574	67,307,390	19.9	68,599,692	26,384,497	17,076,855	12,363,021
Wheat	1,426,112	11,924,010	8.4	16,884,398	6,367,421	4,364,188	3,069,240
Total .	5,035,999	81,956,730		87,280,628	33,467,045	19,981,749	15,764,533

Total value of Nitrogen	$13,092,094.00
Total value of Phosphoric Acid	1,673,352.00
Total value of Potash	999,087.00
Grand Total	$15,764,533.00

The three logical methods of maintaining the soil fertility are the use of animal manure, mineral or artificial fertilizers and the plowing under of green crops or vegetable matter. Mineral manures do not furnish vegetable matter and hence stable manure must be used in connection with green corn crops. The value of the mineral fertilizers, when used as a supplement to manure, was pointed out by Mr. Plumb.

Amount and value of manure produced per 1,000 lbs. live weight.

Class of animal	Amount per day	Value per day	Value per year
Horse or mule	48.8 lbs.	7.6 cents	$27.74
Cow	74.1 lbs.	8.0 cents	29.27
Calf	67.8 lbs.	6.7 cents	24.45
Sheep	34.1 lbs.	7.2 cents	26.09
Hog	83.6 lbs.	16.7 cents	60.88

The total value of the manure produced by Tennessee animals amounted to more than thirty-eight million dollars in 1899. Under present conditions Prof. Plumb figures that we are only producing one-half what we should. Tennessee is admirably fitted for stock raising, as demonstrated by some of her noted herds of cattle and studs of horses. The conclusion is reached that progressive agriculture is based on an important development of the herds and flocks.

A discussion followed, led by such men as J. H. McDowell, John L. Jones, and Percy Brown.

The second day's session was conducted largely by Profs. Morgan and Plumb.

Prof. Morgan took up the feeding question from a scientific standpoint, at the same time presenting the subject in such a simple manner that every farmer present could catch the meaning. He used the terms crackers and cheese in referring to the different feeds on the farm, putting those with a higher protein content under the head of cheese, while under crackers were placed the feeds with a higher percentage of carbohydrates. The talk by Prof. Morgan was splendidly received by the large audience, and at the close many questions were asked him, all of which were answered to the satisfaction of every person present. Prof. Plumb followed with a very interesting speech on "Essentials in the Breeding of Live Stock for the Farm." The arguments in the main were along the same lines as discussed in his first speech. In his remarks he explained more fully the way to gain the best results in breeding, and the kind of animals to use for such purposes.

Dr. Tait Butler, unfortunately, did not get to the Convention in time to take part in the program as scheduled, but on Thursday morning made a very short talk on the fertility of our Southern soil. He spoke very highly of the work that has been done by the scientists in agriculture, the so-called book farmer, and paid a high tribute to the men who have devoted their lives to the development of Agriculture.

Horticultural Section

Mr. Charles Coleman gave a practical talk on Strawberry Culture. He gave in detail the record of a one acre strawberry patch that yielded 9,000 quarts in 1909.

The land was in strawberries in 1906. The field was broken after the crop was gathered and sown to peas, which were turned under and followed by rye. In the spring of 1907, when the rye was knee high, it was followed by sorghum and peas which yielded two tons of good hay. The aftermath, which was very heavy, was plowed in with a chain and rye was again sown for a winter cover crop. In early May the rye was plowed in. It was so heavy that a chain was used in turning it under. The land was then thoroughly disced and harrowed, and when perfectly prepared furrows were opened three feet apart. 1,000 pounds of 10-2-2 fertilizer were distributed in the furrows, the land bedded back, and the plants (Aroma) set three feet apart, with two hills of potatoes between. The cultivation was thorough. 125 bushels of potatoes (8 bu. culls) were har-

vested, and thereafter it required much work with potato forks to thin the strawberry plants sufficiently in the hows. Fully two wagon loads of plants were thus hoed out before the close of the growing season. The leaf growth was so heavy that it was feared a poor crop would result, but the only effect of the great amount of vegetation, and the heavy application of fertilizer that had been plowed with the land was to slightly retard the ripening of an enormous crop. The net profit of this acre was $503, after deducting from the gross receipts the cost of fertilizer, crates, boxes, and picking. The potato crop more than paid the cost of tillage.

Mr. H. P. Gould, of the U. S. Department of Agriculture, spoke on orchard management. He discussed the life of an orchard from the setting out to old age. In selecting a location, a good, deep, loamy soil is essential, a southern exposure being the best. As to the varieties grown, one should be careful to grow enough of one kind to ship successfully. He laid special emphasis on the need of having the trees fork low, and also on pruning the tree so as to get the best form, one that extends outward rather than upward.

Mr. Gould thought it profitable to grow crops between the trees for the first few years, i. e., till the roots have occupied the space between the rows.

Deep cultivation should cease after the first few years, as root-pruning might occur. The self-boiled lime-sulphur wash, 8-8-50, was recommended as the best remedy for fungous diseases.

The second horticultural meeting occurred at the University fruit farm. Under the direction of Prof. Keffer, the men were shown the orchard and vineyard, and in a short talk he called their attention to the sites, methods of planting and pruning, and value of thinning the fruit (peaches). The self-boiled lime-sulphur wash was discussed, and at this point the Professor made a mixture after the following formula, 32 pounds lime, 32 pounds sulphur, 200 gallons water, and afterwards applied it to the peach trees. The purpose of this spray was fully explained and all present agreed that the demonstration was a success, as far as the making and application is concerned.

Dairy Section

The dairy section of this year's Convention was by far the most satisfactory and enthusiastic the dairymen of East Tennessee have ever had. The whole theme was the production of larger returns, and products of better quality from their herds. With regard to increasing the production of dairy products, Helmer Rabild, of Dairy Division, B. A. I., U. S. Department of Agriculture, Washington, D. C., and Prof. C. H. Eckles, University of Missouri, were heard in very instructive talks, Mr. Rabild showing by means of charts a large amount of data

which has been collected with regard to the value and importance of keeping an exact record of the production and cost of feeding each cow in the herd. These charts showed that in many instances when a dairyman began keeping records of his cows he found that a large per cent of his herd were not paying for their feed, and he was therefore keeping them at a loss. The objection raised by one dairyman towards keeping records was that he might find that none of his cows were yielding him a profit and if he were to sell them he could not procure any others due to scarcity of good dairy animals! Prof. Eckles spoke on the development of the dairy cow with special reference to increasing the production of the individuals of the herd with as little outlay of money as possible. Asserting also that the average farmer, unless he intended to establish a purebred herd, could not afford to pay the high prices commanded by registered animals, but that his field lay in the use of a registered sire of a good producing family of the chosen breed, on the best grade cows that could be purchased. This to be supplemented by testing and keeping records of the individual animals in order to select out the profitable ones from the star boarders. As a solution of the problem of the scarcity of dairy cows he advised the raising of every heifer calf which gave any promise of developing into a profitable cow. With respect to the production of products of better quality, Mr. J. O. Schaad, a practical dairyman, spoke on the farmer's side of the question, emphasizing the production of clean milk, and the importance of freeing the premises of all sources of contamination. Mr. D. W. Jackson of the Knoxville Pure Milk Co., emphasized the especial importance of cleanliness, and the right temperature in furnishing to the milk plant milk of the most desirable quality. Dr. Jacob recited briefly the work of the Board of Health of the City of Knoxville in the inspection of dairy herds and barns in the vicinity. He stated that they had met with ready response to all suggestions for improvement of conditions, that they had not been radical in their condemnation of conditions so as to antagonize the owners, but that they had allowed time for conditions to gradually improve. In the future, however, he said the score card was to be used in judging dairies with the view of obtaining increasingly better conditions. Prof. Barnes spoke on the use and care of farm separators, cautioning the utmost care toward cleanliness of the machines at all times. At the close of the first day's session a butter contest was held, quite a number of the dairymen having brought in samples of their production. Mr. Rabild acted as judge.

Home Making Section

The Home Making Section of the Convention was organized with the following officers: Mrs. Jas. A. Reagan, President; Mrs. J. I. Huggins, Vice-President, Miss Catherine A. Mulligan, Secretary-Treasurer.

While the meetings were not largely attended they represent a begin-

ning in a work that all over our country is receiving enthusiastic attention.

It was brought out most emphatically in all the sessions that the home is the center of the farm, and that the children are the most valuable possessions of the home. So if the men meet to discuss the welfare of horses and pigs, the women should come together to consult about the home, and a balanced ration is of more importance in the rearing of children than in the raising of cows.

Mrs. Reagan read a suggestive paper on the needs of co-operation among farmers' wives.

Miss Virginia B. Moore spoke of the wonderful work done by the school improvement association in the State.

The ladies visited the classrooms of the Home Economic Department of the University, where they saw on exhibition the sewing done by the Freshmen, and the attractive dishes prepared by the students of the Sophomore and Junior Classes in cookery.

On Wednesday the Senior Class in the Department prepared and served the following lunch to all in attendance.

Chicken Croquettes

Lettuce Sandwiches Cheese and Date Sandwiches

Ice Tea

Mr. Mulvania gave an interesting and instructive lecture upon the care of food in the home, and Mrs. Madden made a short talk on poultry raising.

The officers of this section of the East Tennessee Farmers' Convention earnestly request that our women plan to come for the three days next May that we may discuss questions of interest to the farmer's wife.

Poultry Section

The Poultry Section was held in the University Y. M. C. A. building, J. A. Dinwiddie acting as Secretary.

Prof. T. C. Karns, of Powells Station, discussed the subject, "Shall more than one breed be kept in each farm?" He said that the poultry producer should be thoroughly informed with one good breed and then carry out his knowledge. The necessity of keeping yarded birds in good condition, by plenty of food, grit, and exercise was given much emphasis.

Capt. T. E. McLean had a rather interesting article on "caponizing." Special stress was given to capon chickens for northern markets. East Tennessee farmers might receive from 25 to 50 cents per pound for such birds. Caponed birds are more gentle and will brood young chickens well when given proper attention.

The second day's session began with V. S. Bright, of Hickson, Tenn.,

who discussed "Poultry Raising from an Educational Standpoint." The educational development of poultry raising in Tennessee, and the great strides which have been made in poultry during late years, were touched upon.

J. A. Dinwiddie, of New Market, Tenn., gave a talk on "Lands, Fences and Crops." To make a success of poultry raising, one must have a knowledge of it, and fences, houses and roosts should be built with plenty of space for exercise. But the most important part is the feed, feeding and breeding, and to be a successful producer one must give much attention to these factors.

Hon. T. S. Quisenberry, of Missouri, the main speaker of this section of the Convention, discussed the co-operative plan of selling farmer's high-class eggs at a reduced price in order to get them to raising a finer stock of birds. This quotation. Put something into the poultry business; not money, but time and energy, and in the end you will be much better satisfied with the work, and the money will come in faster in the long run." It was suggested that the way to interest the East Tennessee farmers in the poultry business is to hold annual shows in each county, and to organize a state poultry association.

EDITORIAL

This issue of the U. T. Farmer is dedicated to a recent benefactor of the magazine, Mr. George W. Callahan, of Valley View Farms, as a partial recognition on the part of the Agricultural Club of his generosity.

It has not been easy to finance this magazine. Agricultural students have not even a bowing acquaintance with Croecus nor any of his ilk. We have tried to make a useful publication, we appreciate its usefulness to ourselves, at least, as an educational aid, and we have made real sacrifices to maintain it. But in spite of our efforts it has not proven thus far a self-sustaining venture. Our business managers have had the satisfaction of seeing the circulation increase each year, but our magazine cannot yet command the advertising rates so eagerly paid for space in publications of no greater worth, but somewhat more extensive circulation, such as the Saturday Evening Post!

Like many a worthy enterprize, we confess ourselves to be in a position of receptivity to all those who are philanthropically inclined—not that we are beggars, but rather, that we are willing to share the opportunity of service which this publication offers—the spread of good agricultural gospel.

Our need having been called to the attention of Mr. Callahan, he has generously contributed substantial aid, relieving our immediate embarrassments, thus enabling us to close the year free from debt, and promising an annual contribution to the magazine hereafter. We thank him heartily, and we are glad of an opportunity to tell our readers not only of his kindness, but something of his work as a farmer, as well.

———::———

The 37th annual meeting of the East Tennessee Farmers' Convention and Institute was held here in the University, May 17, 18, and 19. The farmers over this part of the State realize the purpose of this Convention—that is, to present better farming methods as well as create a greater interest in farm work generally—and they have shown their appreciation by turning out in larger numbers each succeeding year. It was especially gratifying to note the large numbers of ladies and young men in the audiences, refuting, in a measure, that oft repeated statement, that young folks are leaving the farms. The crowd was a very representative one, every county in East Tennessee sending its quota of delegates. Much credit is due the vice-presidents for the work of organizing and looking after their delegations. This Convention is fortunate in having a good Program Committee, one that looks after the farmer's interest and able to bring him almost exactly what he needs most. In addition to our home talent—agricultural professors and men from over Tennessee—we had other prominent speakers with us, among whom were Director Chas. E. Thorne, Ohio Experiment Station, Prof.

Geo. I. Christie, Purdue University, Prof. C. S. Plumb, Ohio University, Prof. C. H. Eckles, University of Missouri, Hon. A. P. Sandles, Secretary of Agriculture of Ohio, Hon. T. E. Quisenberry, Secretary Missouri State Poultry Board, H. P. Gould, Pomologist, U. S. Department of Agriculture, W. S. Keller, Office of Public Roads, Alabama, and Dr. Tait Butler, Starkville, Miss. These gentlemen produced the goods and made the farmer feel that he could learn after all some practical things from what he had so ignorantly termed "book larning." They presented their respective subjects in a clear and forceful manner, making frequent use of charts and maps.

No less instructive and interesting were the remarks of our Tennessee speakers, Col. Thompson, Hon. J. H. McDowell, Prof. R. L. Jones, Geo. Peay, Phil S. Taylor, Prof. V. S. Bright, and our Agricultural Faculty, Professors Morgan, Mooers, Keffer, Bain and Barnes.

It was no new trick for them to address the farmers, and the way Prof. Morgan talked to the Live Stock Section on Wednesday afternoon, of the second day, was an inspiration to all. From beginning to end the farmers manifested not only a willingness, but an intense desire to hear what was being said. All the meetings were well attended. On the other hand, the Professors and speakers realized their opportunities of reaching the farmer, and lost no time in getting to him. The very natural results of such interest must be good, so much so in fact, that after the last speech, the farmers hurried home, anxious to put in practice the things they had learned. Some had come from poor farms, with the feeling that a trip to town would be a recreation, but with no thought of "taking in" the Convention. These so-called farmers wandered up to Jefferson Hall, where the Convention was in progress. A few scattering words about poor farms and bad management attracted their attention, then curiosity prompted them to take a seat, and before the session had ended these same fellows had resolved to turn over a new leaf and, as it were, start anew. These same men may go back home, change their bad methods for better ones, and prove that scientific farming is after all the only way to farm successfully.

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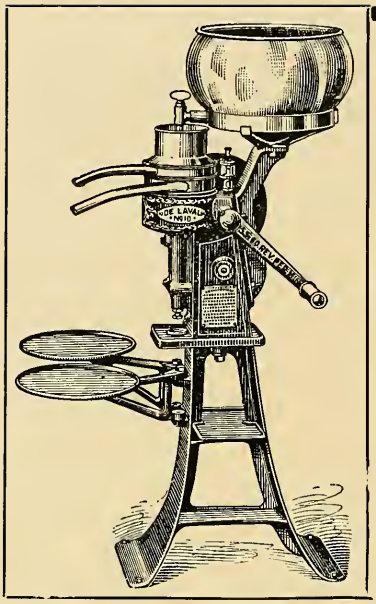

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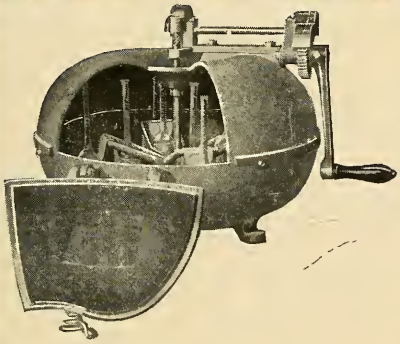

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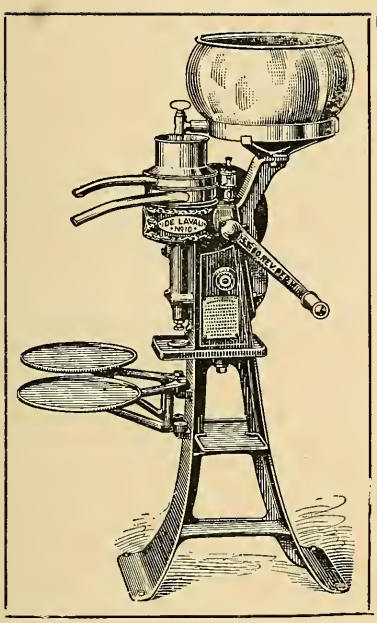

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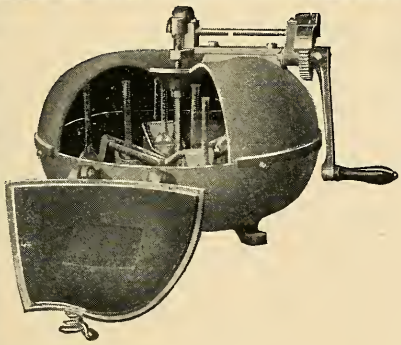

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182-188 Kinzie Street, Chicago, Ill.

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You know they are the best. You can see The Wm. J. Oliver Plow work at the University Farm. We should be pleased to have you call at the factory and we will gladly show you how we make the Best Plow on Earth.

THE WM. J. OLIVER MFG. CO.

DALE AVENUE KNOXVILLE, TENN.

INTELLIGENT SPRAYING

The Rural New-Yorker stated editorially, Sept. 19th, 1908:—"The Rural Grounds now appear to be free from scale for the first time in 12 years. * * * It has been a long fight, excessively discouraging until the soluble oils came to the rescue three years ago. The prospect brightened at the first trial of these handy preparations, and repeated use seems to have resulted in victory." Spraying was omitted this year.

"SCALECIDE"

alone did more in three years than Lime-Sulphur and other "dopes" did in nine. Are you still in the Lime-Sulphur ranks?
PRICES:—In barrels and half barrels, 50c. per gallon; 10 gallon cans, $6.00; 5 gallon cans, $3.25; 1 gallon cans, $1.00.
Send for Booklet, "Orchard Insurance."
If you want cheap oils, our "CARBOLEINE" at 30c. per gallon is the equal of anything else.
B. G. PRATT CO., MFG. CHEMISTS, 50 CHURCH ST., NEW YORK CITY.

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WE ARE ALWAYS IN THE MARKET FOR LIVE HOGS

Does Your Soil Need Lime?

LIME:

1. Cures soil acidity, and improves mechanical and physical condition of the soil.
2. Increases crop production.
3. Increases activity and value of soil and commercial plant food.
4. Encourages growth of legumes and supplies nitrogen out of the air.
5. Makes possible the growing of alfalfa and clovers.
6. Permits more economical rotations.
7. Is especially beneficial to meadow and pasture grasses.
8. Makes animal husbandry possible.

GROUND LIMESTONE:

1. When applied in double the quantity is as effective, if not more so.
2. Is much less expensive than burnt lime; lower freight rates.
3. More easily and uniformly applied.
4. Less destructive to vegetable matter of soils.
5. Not made ineffective by being rained upon.
6. State and United States authorities recommending ground limestone.

We manufacture and sell Ground Limestone.

Shipping Points:—Columbia, Tenn., and Rockwood, Ala.

Foster-Creighton-Gould Co.

401 Church Street,

NASHVILLE, TENNESSEE

U. T. FARMER

A Bunch of Steers being Fed at the University Farm.

Vol IV. No. 3

DECEMBER, 1909

Published Monthly by

THE AGRICULTURAL CLUB

of the

UNIVERSITY OF TENNESSEE

KNOXVILLE

University of Tennessee

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thorough and taught by able Specialists. Two well equipped Farms. Model Dairy and Fine Laboratories. Fine Dairy Herd and other Stock. Well equipped Poultry Farm. Good equipment for Bee Culture. Fine equipment and thorough courses in Domestic Science, Home Sanitation and Home Adornment.

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For Farmers, their Wives, Sons and Daughters, during months of January and February. Expenses very low. For circulars of Information in regard to the Agricultural Courses or other work of the University, - - address,

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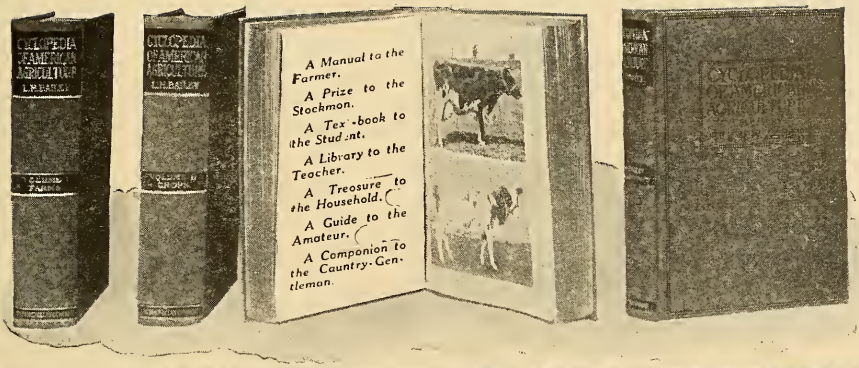

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and is complete in four handsome, quarto volumes, so profusely and accurately illustrated that every part of the text is made clear for the veriest novice.

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treats each animal separately and thoroughly. Cattle, horses, sheep, swine, poultry and all domestic animals; how to select them, how to feed them and keep them in health, and how to breed successfully. Some of the best known experts in the country have made this volume the most practical treatise on farm stock ever published. A final volume deals in the most up-to-date manner with the sociological problems of farm life and the relation of agricultural interests to our national welfare.

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THERE is no season of the year when an I. H. C. engine will not be of use to you. Many times it will take the place of a hired man and save you a hired man's wages. It will make easy jobs out of the hard jobs. It will enable you to get more and better service out of your other farm machines. Don't let the item of first cost keep you from owning a faithful, dependable helper which

Works for You at from 25c to 40c a Day

Many a time an I. H. C. engine will save the hiring of a man at from $1.50 to $2.00 a day.

That is repaying the first cost rapidly.

I. H. C. gasoline engines are ready whenever called upon. They are made in many styles and sizes and they are especially adapted to farm purposes.

The line includes:

Vertical 2, 3 and 25-horse power.

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Gasoline tractors 12, 15 and 20-horse power.

Famous air-cooled 1 and 2-horse power.

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Also a complete line of Famous mounting engines from 4 to 20-horse power, and sawing, spraying and pumping outfits and jacks.

Count the uses you have on your own farm for a reliable power and figure up how many days in the year you could use such a power to advantage. Then go and talk to the International local agent about it. The catalogs he will hand you will give full particulars. If you prefer write us for further information.

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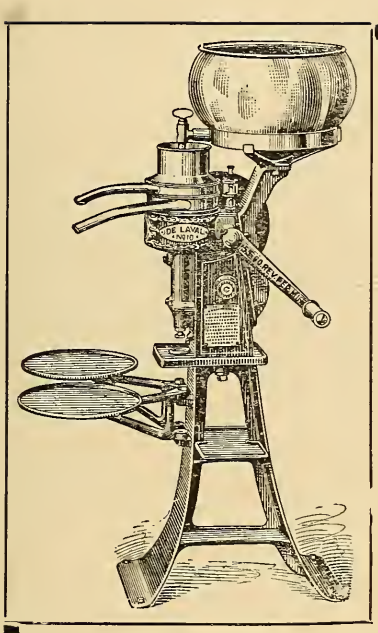

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Cream Separators

First—Always Best—Cheapest

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Ten years ahead of all others in every feature of separator practicability

BEAUTIFUL IN DESIGN
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Do you know that it is a real sanitary cleaning and washing powder? Yes, so sanitary that it will not even affect warm milk, and at the same time so harmless that you may use it to wash the best garment or fabric without the least fear of injuring it.

Do you know that it looks and acts much like borax and like borax it makes no suds and contains no lye?

Do you know it will do more washing and cleaning than either soap or borax and has more uses than both of them together?

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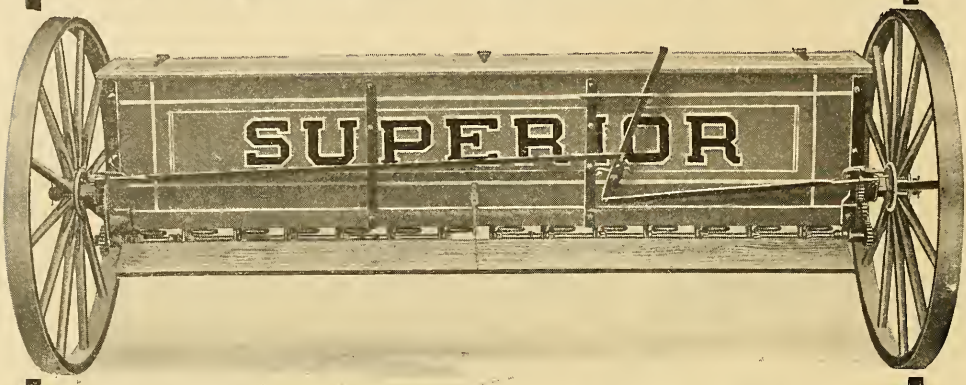
Why, if you will try it just once on the family washing the white, snowy, sweet smelling clothes will tell the story. You will use it next time because you know Wyandotte Cleaner and Cleanser will do so many things that, once you learn even a few of them, you will wonder how you ever did your work so long without it.

Just ask your dealer for one of those big 25 cents sacks of Wyandotte Cleaner and Cleanser.

THE J. B. FORD COMPANY, Sole Mfrs., Wyandotte, Mich., U. S. A.

This Cleaner has been awarded the highest prize wherever exhibited.

SUPERIOR BROADCAST Lime and Fertilizer Sower



Capacity of Hopper, 12 Bushels, 390 Quarts or 780 Pounds

Sows a Strip Nine feet and Five Inches Wide.

Sows Prepared or Granular Lime, Nitrate of Soda, Commercial Fertilizers, Land Plaster, Dry Wood Ashes, etc., in wide range of quantities.

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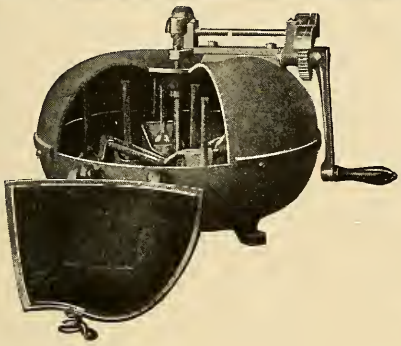

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DALE AVENUE KNOXVILLE, TENN.

5 YEARS' use has proven that SAN JOSE SCAL
and all FUNGOUS diseases, controllable during the dormant season, are absolutely control by the use of

"SCALECIDE"

There is but one—"PRATT'S" Trade Mark, Reg. U. S. Pat Off.
Prices: In barrels and half-barrels, 50c. per gallon; 10 gal. cans, $6.00; 5 gal. cans, $3.2[illegible]; 1 gal. cans, $1.00. If you want cheap oils, our "CARBOLEINE" at 30c. per gallon is the equal of ANYTHING ELSE. Send for free Booklet, "Orchard Insurance."

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U. T. FARMER

THE UNIVERSITY FROM SOUTH OF THE RIVER.

Vol IV. No. 4

JANUARY, 1910

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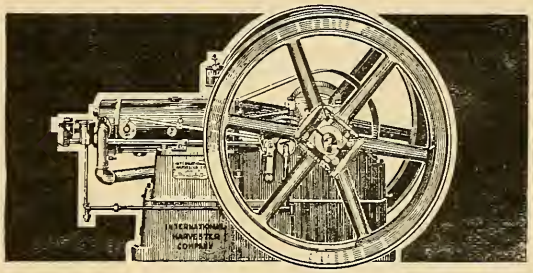
A RELIABLE POWER IS A FARM NECESSITY



You can do twice as much farming without doubling your force of helpers, by adding an I. H. C. gasoline engine to your equipment of implements and machines.

Your men will be able to turn out twice as much work. They will save time and you will save money, energy, worry and delay.

With an engine, the hired-help problem is simplified—you will be freed from the worry of unreliable, inefficient and dissatisfied help. The efficiency of your other farm machines will be more than doubled. You can operate, at minimum cost, your grinder, fanning mill, cream separator, churn, pump, thresher, huller, cutter and other farm machines without the need of even one helper. You can also have a power-house on your farm, where you will always find a willing power to do your work You can have electric lights for your home—just belt your engine to a little dynamo. There should be no difficulty about an adequate water supply for fire protection, for general use about your premises, or for irrigation if you find that necessary.

Sit down and figure the price of labor by the year; calculate what it costs to feed a man; include your losses when you could not find help in busy seasons; and it won't take long for an International agent to sell you an

I. H. C. Gasoline Engine

one of the farmer's own line. When he explains its varied uses; its simple construction; how cheaply it can be operated; and how long it will render service, it won't be a question as to whether you can afford one, but how you ever got along without it.

Go to our local agent and look over the line. It includes an engine for every section and every problem; of all sizes and all costs, for all farm uses—vertical and horizontal (both stationary and portable); engines on skids; sawing, pumping and spraying outfits. It also includes I. H. C. gasoline tractors—first-prize-gold-medal winners—the best all-around farm tractor by test. Information regarding I. H. C. engines will be cheerfully given by the local agent; or, if you prefer, write to us direct for catalogue, prices and details.

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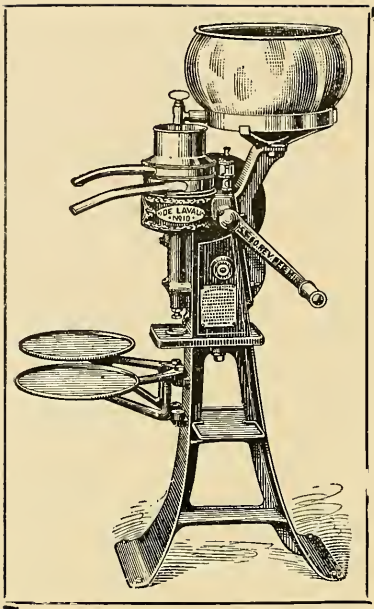
INTERNATIONAL HARVESTER COMPANY OF AMERICA
(INCORPORATED)
CHICAGO, U. S. A.

Look for the I.H.C. Trade-Mark. It is a Seal of Excellence and a Guarantee of Quality.



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1910
GREETING

It has been an honor the past year to have served you, one and all, the friends of

Wyandotte
Cleaner and Cleanser

and to you we pay tribute. It also pleases us to say that during the coming year, as in the past, our every endeavor shall be for the advancement of all interests which will assist in making the dairy and the home more clean and sanitary.

Most heartily and sincerely we bespeak for you the greatest measure of success and happiness, and wish you A Prosperous Year.

THE J. B. FORD CO.,

Wyandotte, Mich., U. S. A.

Here Are Two Machines That Are Worthy of Their Names

One We Call "Perfection" --- The Other "Universal"

Below You Will Find Why

THE AVERY "PERFECTION" UNIFORM DEPTH PLANTER

(Edge Drop or Flat Drop Plates)

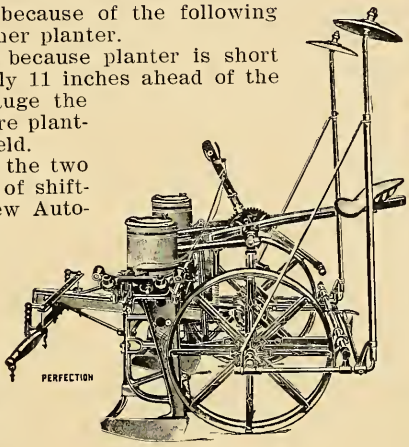
It deserves its name, "Perfection," because of the following Improved features not found in any other planter.

A More Uniform Depth of Planting because planter is short coupled, the heels of runners being only 11 inches ahead of the center of the wheels. The wheels gauge the depth of the runners and all the hills are planted at a **Uniform Depth** all over the field.

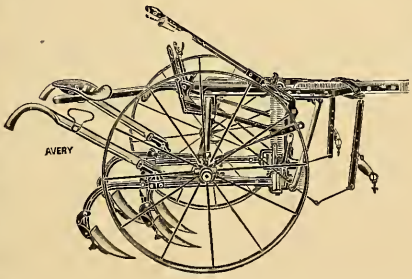
Less Work for the Operator because the two Markers do away with all the trouble of shifting a Single Marker and with our New Automatic Self-Lift the weight of the operator does practically all the lifting of the planter front.

Less Work for the Team. Planter is much lighter in draft because short coupled.

Other Features Are: Improved Drop, Adjustable Width, Extra Durable Steel Frame, Perfect Clutch, Tilting Hoppers, Adjustable Steel Eveners, Hardwood Singletrees and Neckyoke, Pointed, Sled, or Double Disc Runners. Can also be supplied with Fertilizer Attachment.



The Avery "Universal" Combined Rider and Walker Adjustable Arch—Balance Lever



It's **"Universal"** because it can be used as a Rider or Walker. Perfect Balance either way. Simply push seat over and adjust Balance Lever.

It's **"Universal"** because it has an Adjustable Arch. Plows wide or narrow rows as desired.

It's **"Universal"** because everybody likes it.

Other features in the **"Universal"** are:

Handy Depth Regulating Levers—Quick and Accurate Adjustments. And the Avery Double Acting Lifting Springs—The Perfect Balance Style—do almost all the work of handling the Gangs. Also has Adjustable Handles and Screw Cap Dust Proof Boxes. Any Style Gangs. Ask about the **"Universal."**

Both of these machines are used by the State Agricultural Experimental Schools at Knoxville and Jackson, Tenn. This is good evidence of their superiority.

Get our complete catalog of Farming Machinery. Its free. Address

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Peoria, Ill.

THE DIP THAT PAYS.

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I have used Chloro-Naptholeum Dip for the past year, as a sheep dip, and I never saw its equal for destroying ticks on sheep, and for a disinfectant, I think it has no equal.

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CHLORO-NAPTHOLEUM DIP HAS STOOD THE TEST OF EXPERTS, THE TEST OF TRIALS AND THE TEST OF TIME. IT IS THE SUREST, SAFEST AND CHEAPEST DIP.

Non-Poisonous **Sure Protection**

Chloro-Naptholeum

The Antiseptic Sheep Dip

Permitted for the official dipping of sheep for scab by U. S. Department of Agriculture, Bureau of Animal Industry.

Use it cold—it does not require heating. This saves time and money. 1 gallon makes 100 gallons of prepared dip. Kills lice, scab, throat and lung worms. Cures mange, itch, sore eyes, colds, catarrh and coryza. Heals cuts, sores, wounds and bruises.

Ask your dealer for Chloro-Naptholeum Dip. If he does not keep it, don't accept a substitute, send to us. We will ship repaid, 1 gallon can, $1.50; 5 gallon can, $6.75; 10 gallon $12.50. Special prices on larger quantities.

We will send you, free, our useful books, "Sheep and Cattle Diseases," and "Swine Diseases." Write for them.

West Disinfecting Company

S. S. Selig, Jr., General Agent **26 So. Forsyth St.**

ATLANTA, GA.

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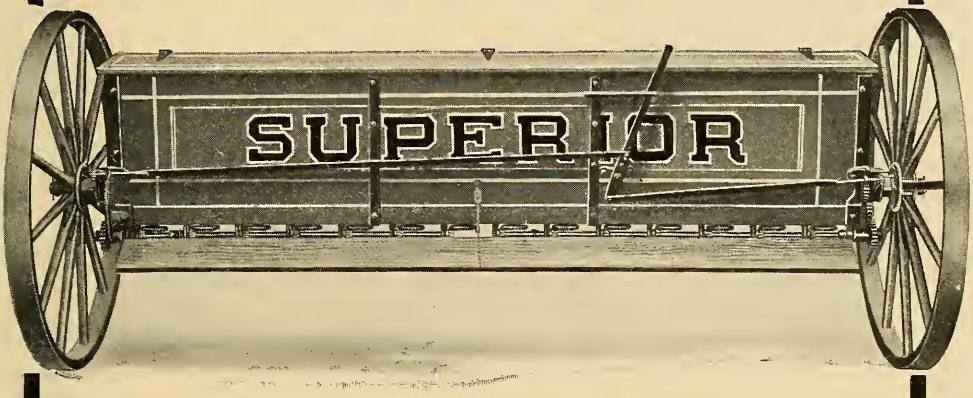

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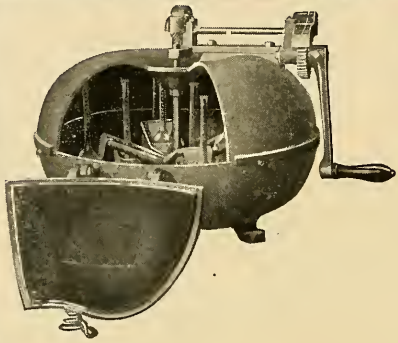

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Vol IV. No. 5

FEBRUARY, 1910

Published Monthly by

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of the

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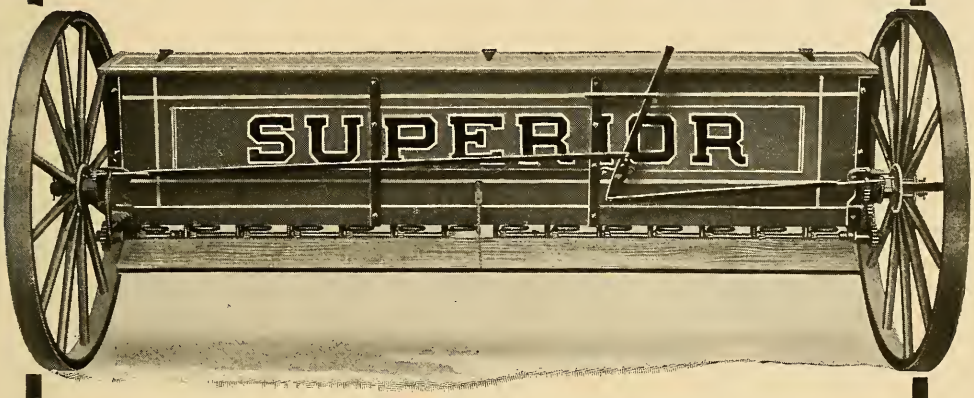

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One We Call "Perfection" --- The Other "Universal"

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(Edge Drop or Flat Drop Plates)

It deserves its name, "Perfection," because of the following Improved features not found in any other planter.

A More Uniform Depth of Planting because planter is short coupled, the heels of runners being only 11 inches ahead of the center of the wheels. The wheels gauge the depth of the runners and all the hills are planted at a **Uniform Depth** all over the field.

Less Work for the Operator because the two Markers do away with all the trouble of shifting a Single Marker and with our New Automatic Self-Lift the weight of the operator does practically all the lifting of the planter front.

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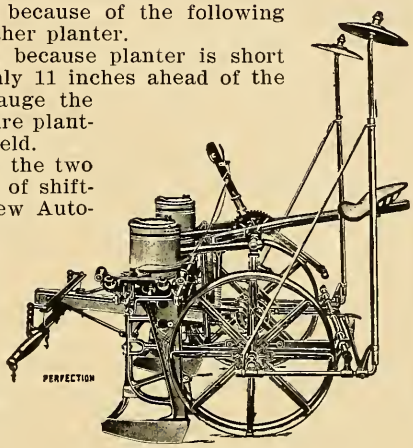

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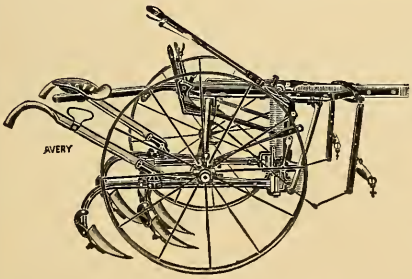

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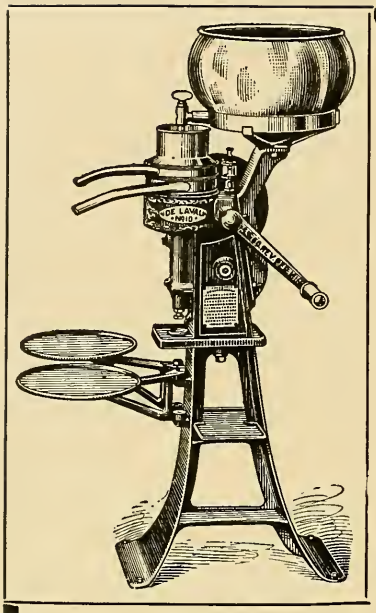

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Its purity, its harmless nature, its unusual cleaning properties and the low price at which it is sold combine to make it an article you cannot afford to be without.

Soap may remove the dirt and grime so as to give everything a clean appearance, but it leaves a greasy deposit of its own more injurious than that which it removes.

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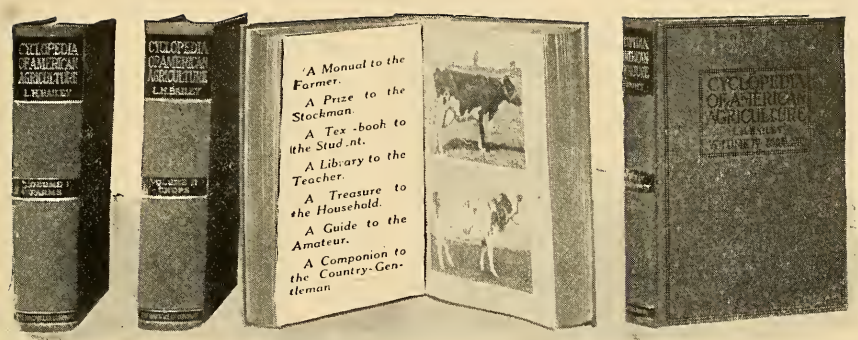

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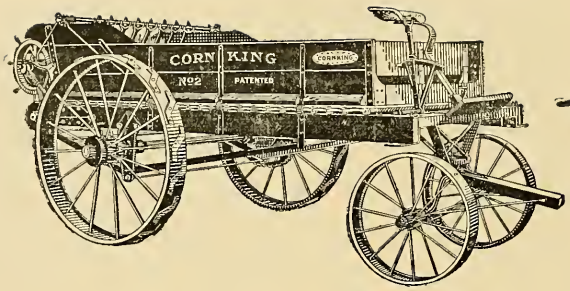

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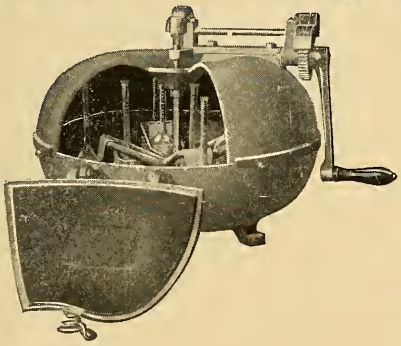

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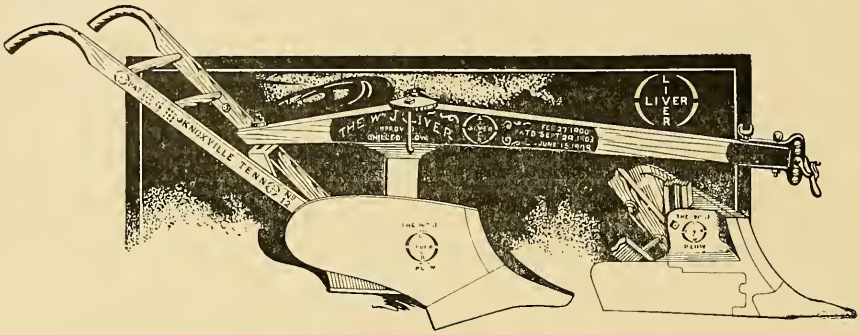

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Three Aspirants to the Dairy Herd.

Vol. IV No. 6

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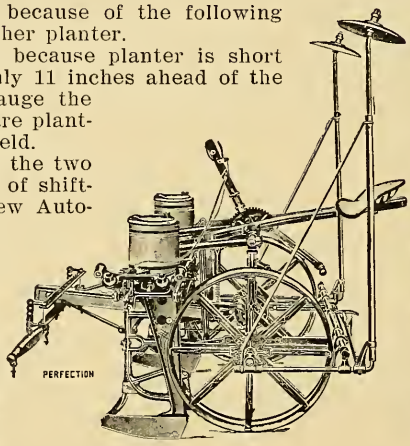

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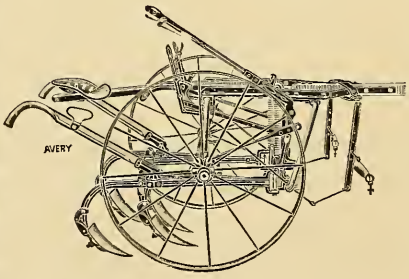

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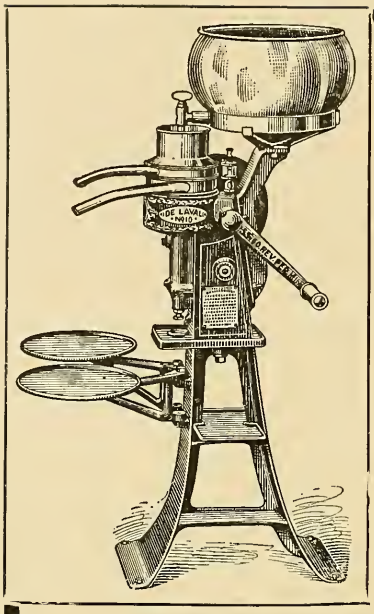

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But would any of these sensible dairy farmers put their money into and carry a $1.—, $5.— or $10.— watch if it cost them from 25 cents to $1.— that they might otherwise save EVERY DAY to do so?

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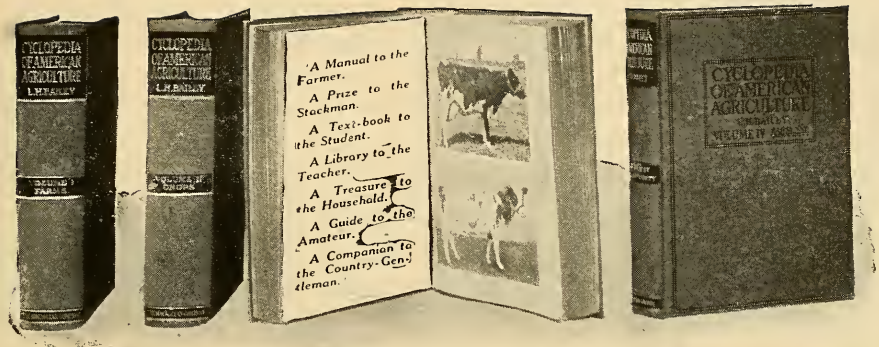

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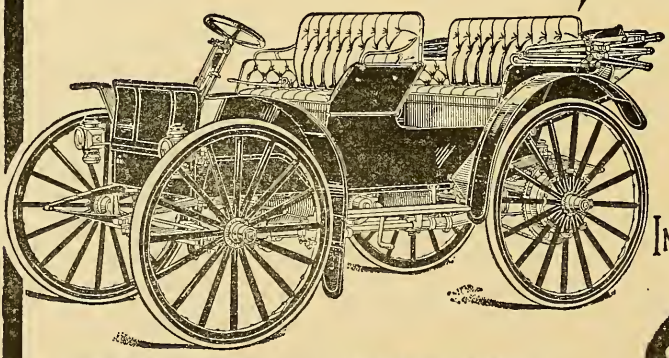

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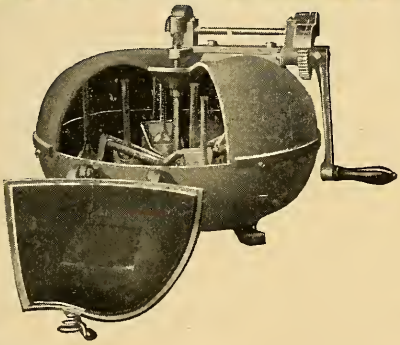

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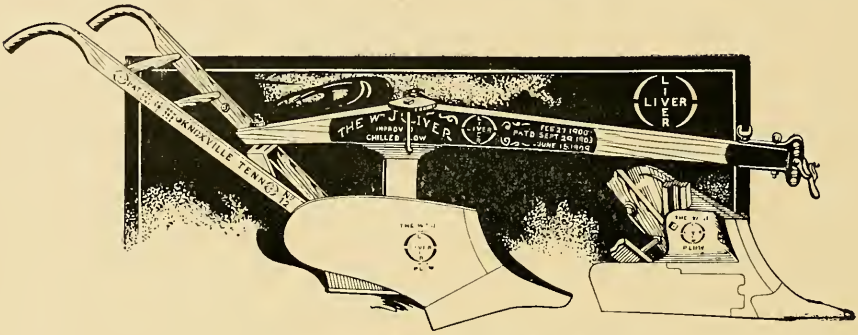

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5. Makes possible the growing of alfalfa and clovers.
6. Permits more economical rotations.
7. Is especially beneficial to meadow and pasture grasses.
8. Makes animal husbandry possible.

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2. Is much less expensive than burnt lime; lower freight rates.
3. More easily and uniformly applied.
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1909 East Tennessee Farmers' Convention

Vol. IV No. 7

APRIL, 1910

Published Monthly by

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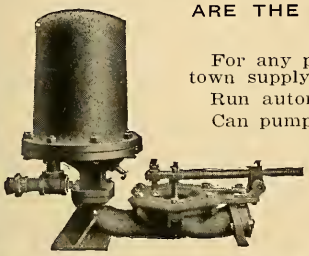

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For any purpose from smallest house or farm to irrigation or town supply.

Run automatically without attention or expense.

Can pump 30 feet high for each foot of fall and can run on as little as 2 feet of fall.

Can use impure branch water to do the work of pumping pure water without mixing.

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For Sale at a Bargain if You are Quick.

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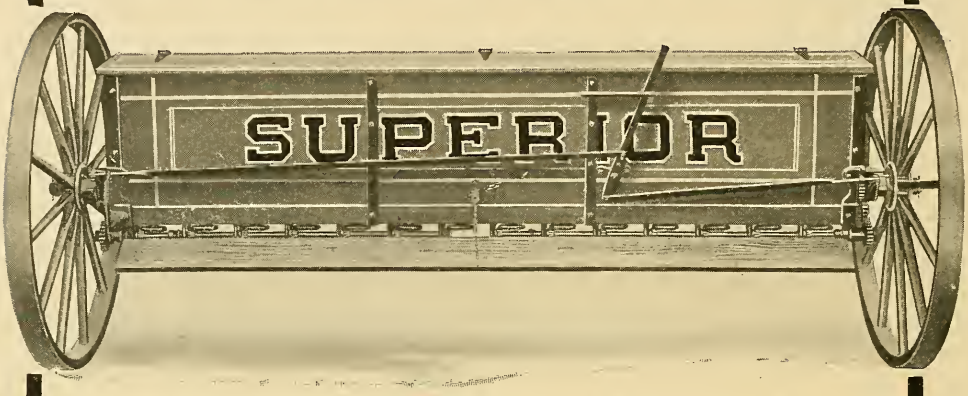
SUPERIOR BROADCAST Lime and Fertilizer Sower



Capacity of Hopper, 12 Bushels, 390 Quarts or 780 Pounds

Sows a Strip Nine feet and Five Inches Wide.

Sows Prepared or Granular Lime, Nitrate of Soda, Commercial Fertilizers, Land Plaster, Dry Wood Ashes, etc., in wide range of quantities.

It has a positive force feed and scatters the materials sown very evenly over the surface.

Superior Broadcast Lime and Fertilizer Sowers are made and guaranteed by the manufacturers of the world-famous Superior Grain Drills, Corn Planters, Wheel Disc Harrows, Evans Potato Planters, &c. WRITE FOR CATALOGUE.

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SOY BEANS COW PEAS

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THE AVERY "PERFECTION" UNIFORM DEPTH PLANTER

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It deserves its name, "Perfection," because of the following Improved features not found in any other planter.

A More Uniform Depth of Planting because planter is short coupled, the heels of runners being only 11 inches ahead of the center of the wheels. The wheels gauge the depth of the runners and all the hills are planted at a **Uniform Depth** all over the field.

Less Work for the Operator because the two Markers do away with all the trouble of shifting a Single Marker and with our New Automatic Self-Lift the weight of the operator does practically all the lifting of the planter front.

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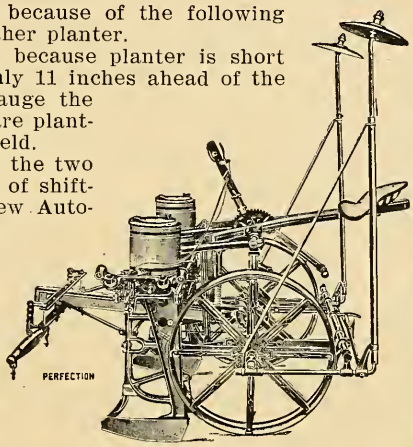
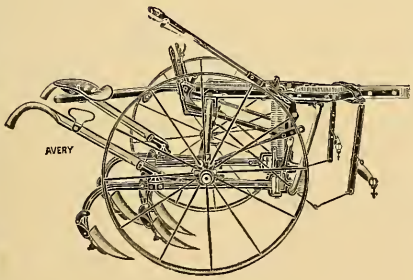
Other Features Are: Improved Drop, Adjustable Width, Extra Durable Steel Frame, Perfect Clutch, Tilting Hoppers, Adjustable Steel Eveners, Hardwood Singletrees and Neckyoke, Pointed, Sled, or Double Disc Runners. Can also be supplied with Fertilizer Attachment.



The Avery "Universal" Combined Rider and Walker

Adjustable Arch—Balance Lever



It's **"Universal"** because it can be used as a Rider or Walker. Perfect Balance either way. Simply push seat over and adjust Balance Lever.

It's **"Universal"** because it has an Adjustable Arch. Plows wide or narrow rows as desired.

It's **"Universal"** because everybody likes it.

Other features in the "Universal" are:

Handy Depth Regulating Levers—Quick and Accurate Adjustments. And the Avery Double Acting Lifting Springs—The Perfect Balance Style—do almost all the work of handling the Gangs. Also has Adjustable Handles and Screw Cap Dust Proof Boxes. Any Style Gangs. Ask about the **"Universal."**

Both of these machines are used by the State Agricultural Experimental Schools at Knoxville and Jackson, Tenn. This is good evidence of their superiority.

Get our complete catalog of Farming Machinery. Its free. Address

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The Antiseptic Sheep Dip

Permitted for the official dipping of sheep for scab by U. S. Department of Agriculture, Bureau of Animal Industry.

Use it cold—it does not require heating. This saves time and money. 1 gallon makes 100 gallons of prepared dip. Kills lice, scab, throat and lung worms. Cures mange, itch, sore eyes, colds, catarrh and coryza. Heals cuts, sores, wounds and bruises.

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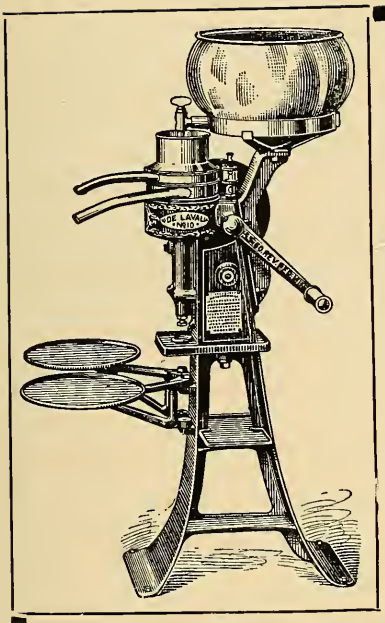

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We cannot believe that there is a sensible man living who would put his own money into the purchase of any other than a DE LAVAL cream separator, for his own use, if he would but first avail of the opportunity open to everyone to SEE and TRY an improved DE LAVAL machine before buying any other.

It is hardly possible to say more than this. It is hardly possible to put the simple truth in plainer words. It would hardly seem possible to say it more convincingly.

The TRIAL of a DE LAVAL machine is free to every responsible man thinking of buying a cream separator. We have agents in every locality for this purpose. If you don't know the agent in your neighborhood send to us for his name and address and it will be a pleasure to give your inquiry prompt and courteous attention.

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Several years ago we could not have said there are a thousand and one uses for

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Dairyman's Cleaner and Cleanser

At that time we did not know there were. Since then its numerous uses have multiplied almost beyond belief.

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Like all other things its merits could not be kept a secret. Today the housewife, too, is rapidly learning how much better it is than soap or washing powder; how pure it is, how easily it rises; and how sweet and wholesome it makes everything washed with it. It is also a great satisfaction for her to know that this cleaner, while not more harmful than hot water, it yet possesses greater cleansing power than either soap or washing powder. Don't hesitate, don't argue just ask your dealer for it or write your supply man to ship you a keg or barrel.

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THE J. B. FORD CO., SOLE MFRS.,
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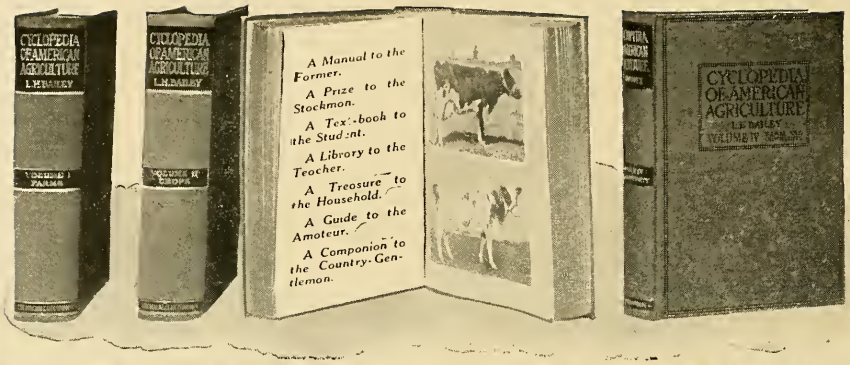

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treats each animal separately and thoroughly. Cattle, horses, sheep, swine, poultry and all domestic animals; how to select them, how to feed them and keep them in health, and how to breed successfully. Some of the best known experts in the country have made this volume the most practical treatise on farm stock ever published. A final volume deals in the most up-to-date manner with the sociological problems of farm life and the relation of agricultural interests to our national welfare.

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The projecting of a Farm; the planning of a Farm; the layout of a Farm and capital required. Land and equipment. Construction of Barns and particularly Sanitary Dairy Stables, cold storage buildings.

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YOU know it costs as much in time, labor, seed and implements to raise a poor crop as it does to raise a good one. You know also that unless your land is kept constantly supplied with lime, nitrogen and phosphates and the ingredients of barnyard manure it becomes worn out and loses its fertility.

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Maybe you don't know that one load of manure evenly spread by a mechanical spreader is worth four loads scattered by hand—

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I. H. C. spreaders are easily drawn. They can be adjusted to spread a thin or heavy coat with equal evenness.

I. H. C. spreaders are so simple in operation that a boy can do the work which used to require a strong man.

An I. H. C. spreader will save in time and labor more than enough to pay for itself in one season.

Your increased income from better crops will be clear profit.

Scientific experiment has proved that this profit will vary from $4.00 to $20.00 per acre.

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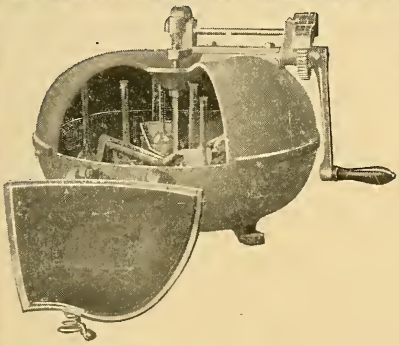

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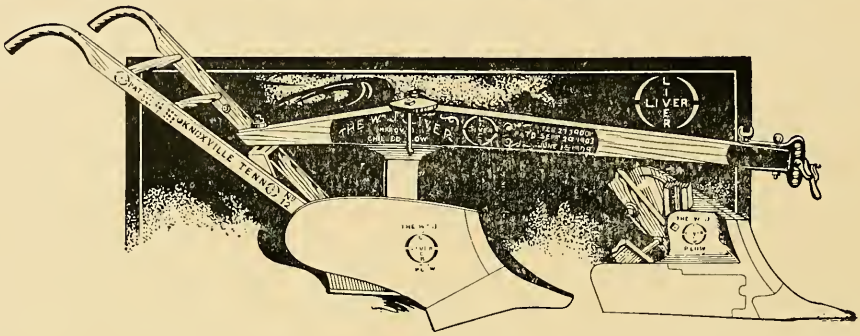

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U. T. FARMER

Deep Tillage

Vol. IV No. 8

MAY 1910,

Published Monthly by

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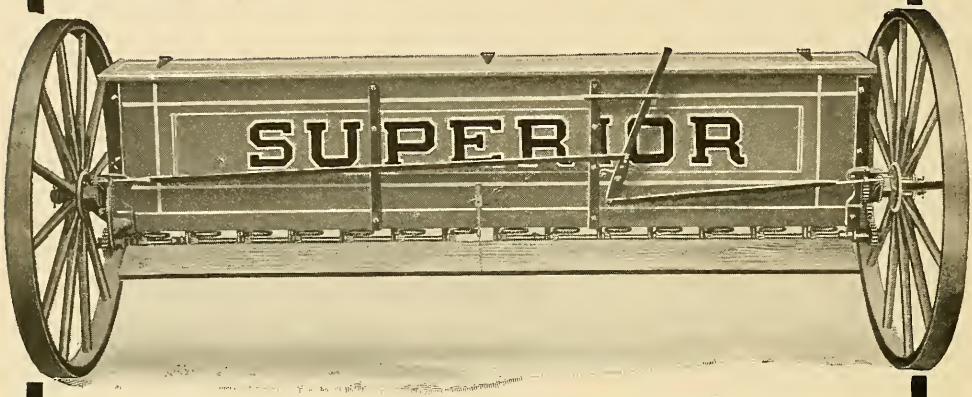
See us for anything in the hardware line, farm implements and fertilizer.

We have the goods, we make the price.

SUPERIOR BROADCAST Lime and Fertilizer Sower



Capacity of Hopper, 12 Bushels, 390 Quarts or 780 Pounds

Sows a Strip Nine feet and Five Inches Wide.

Sows Prepared or Granular Lime, Nitrate of Soda, Commercial Fertilizers, Land Plaster, Dry Wood Ashes, etc., in wide range of quantities.

It has a positive force feed and scatters the materials sown very evenly over the surface.

Superior Broadcast Lime and Fertilizer Sowers are made and guaranteed by the manufacturers of the world-famous Superior Grain Drills, Corn Planters, Wheel Disc Harrows, Evans Potato Planters, &c. WRITE FOR CATALOGUE.

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is a savings account with us. Your account draws 4 per cent interest compounded semi-annually and shares in our profits. Married ladies and children can open an account in their own name, subject to their withdrawal only.

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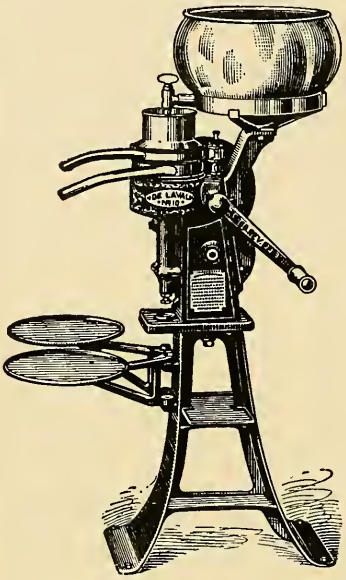
THE BEST INVESTMENT ANY COW OWNER EVER MADE



That's what MORE THAN A MILLION COW OWNERS the world over have found the DE LAVAL CREAM SEPARATOR to be after thirty years of separator use.

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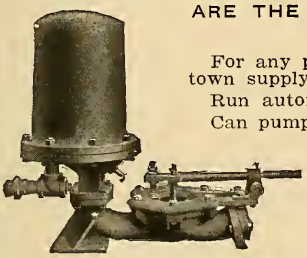

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In every Package

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This Cleaner has been awarded the highest prize wherever exhibited.

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LIME:

1. Cures soil acidity, and improves mechanical and physical condition of the soil.
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3. Increases activity and value of soil and commercial plant food.
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5. Makes possible the growing of alfalfa and clovers.
6. Permits more economical rotations.
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8. Makes animal husbandry possible.

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2. Is much less expensive than burnt lime; lower freight rates.
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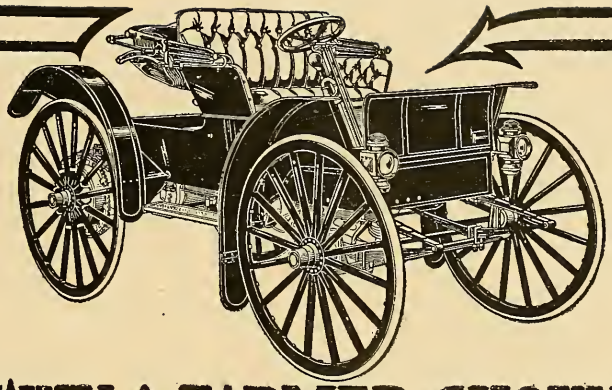

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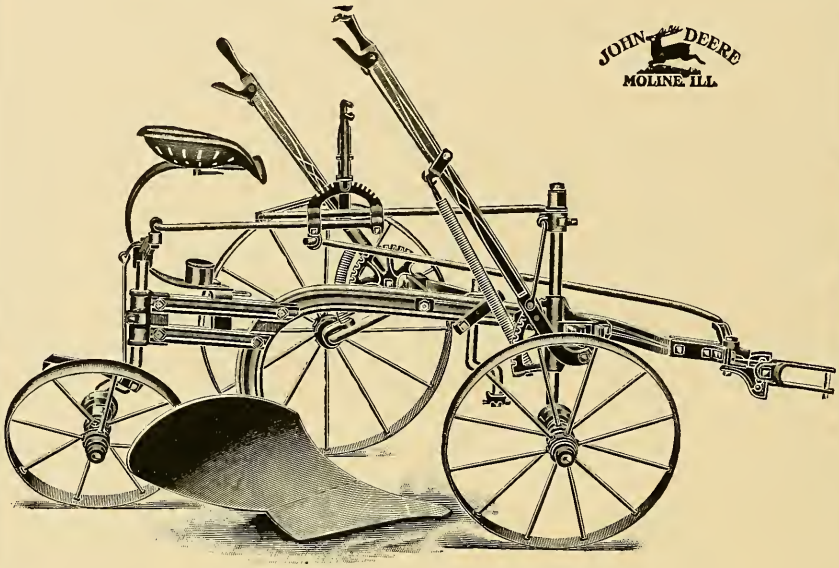

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John Deere Cultivator
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John Deere Plow Co.

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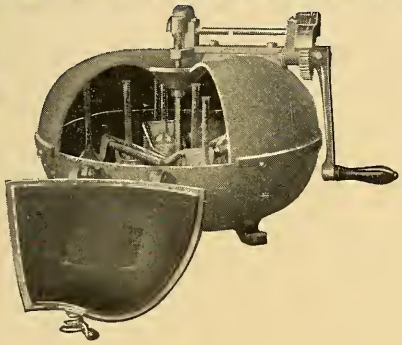

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will point the way to larger yields, cheaper rations, bigger profits. We furnish everything for the dairyman. Ask for catalogue stating the line of goods you are interested in.

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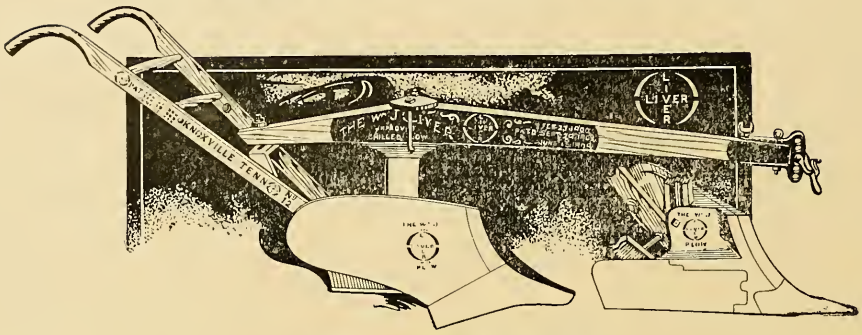

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Vol. IV No. 9

JUNE 1910,

Published Monthly by

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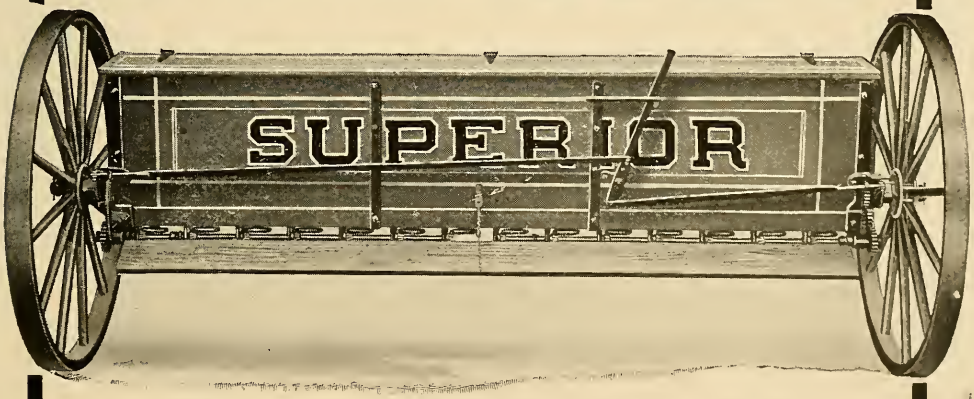

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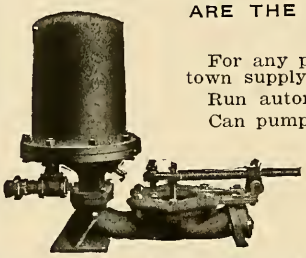

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For any purpose from smallest house or farm to irrigation or town supply.

Run automatically without attention or expense.

Can pump 30 feet high for each foot of fall and can run on as little as 2 feet of fall.

Can use impure branch water to do the work of pumping pure water without mixing.

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A sanitary cleaner must not contain any matter that will decay, nor poison, acid or lye. It must be pure and without taste or odor. Not only must it be clean, but it must also render everything sweet and sanitary. Measured by this test

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Go to our local agent and look over the line. It includes an engine for every section and every problem; of all sizes and all costs, for all farm uses—vertical and horizontal (both stationary and portable); engines on skids; sawing, pumping and spraying outfits. It also includes I H C. gasoline tractors—first-prize-gold-medal winners—the best all-'round farm tractor by test.

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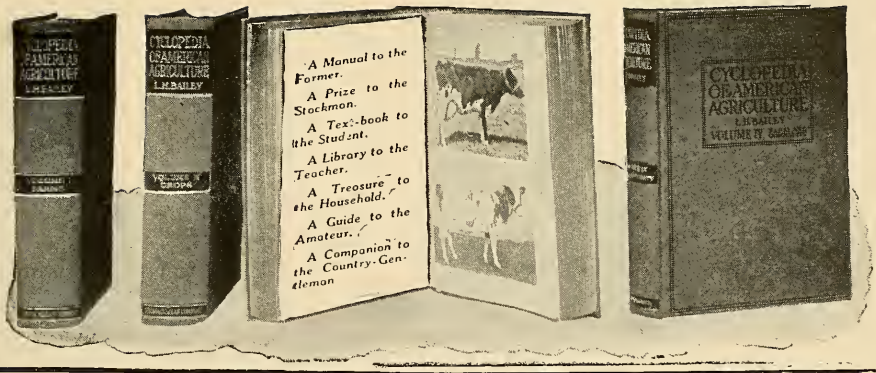

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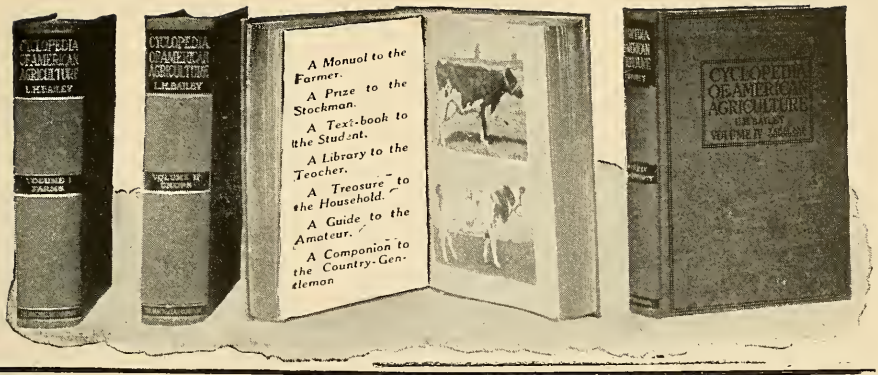

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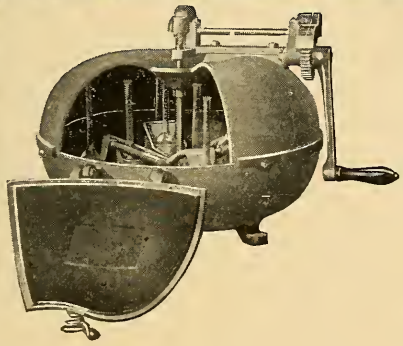

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